THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

VOL. IV.—No. 84. NEW-YORK, MONDAY, JUNE 15, 1863. $3 PER ANNUM.

HOLMES'S MAGNETO-ELECTRIC LIGHT.

The applicability of the electric light as a means of illuminating the signal stations and lighthouses round our coast, is a question which has lately been discussed in the House of Commons, and in the pages of the public journals. On the 17th ultimo, Lord Lovaine made inquiries of the Government relative to the character of the reports which had been furnished to the Trinity Board by Professor Faraday and others, in reference to this system of illumination; and, if successful, what steps had been taken with a view to supplying this apparatus instead of the oil lamps to the Portland lighthouse? The importance of the question led to further inquiries in the House on a subsequent occasion, and, inasmuch as there appear to be many circumstances which bespeak for this subject an attentive consideration, we propose to introduce some of the most prominent points for discussion in the columns of this journal.

In our critical notice of the "Report of the Commissioners appointed to inquire into the Condition and Management of Lights, Buoys, and Beacons," * we referred to the fact of Professor Holmes's light being then, or recently, on trial at the South Foreland, but its employment had not at that time been sufficiently protracted to warrant an extension of the principle, or admit of implicit reliance being placed in its performance. Later results have shown, however, that for an unbroken period of eleven months the electric apparatus has not failed in its action, and the satisfactory accounts of the light at Dungeness, prove that the system is now working in a manner calculated to win the confidence of the mariner. In tracing the history of the experiment, it is stated in these reports that the magneto-electric light dates from December, 1858, when it was first placed at the South Foreland. Its use at that station was discontinued for short periods, in order to introduce improvements, which resulted in its being so far perfected that on August 22, 1859, it was again started, and remained for six months in uninterrupted service. On June 6, 1862, it was permanently fixed at the Dungeness lighthouse, where it has continued in operation to this day. Several official reports appear to have been transmitted to the Trinity House, from which we gather that on April 29, 1859, the Royal Commissioners observed this light (then shown at South Foreland) from a point in the channel midway between Dover and Calais, who reported of it that it was "far brighter than any other lights, visible either on the French or the English coast;" that "at a distance of several miles it cast a shadow which could be seen clearly on the palm of the hand; and, further, it appeared that there was the greatest facility in managing it, and that merely ordinary care was required to insure its regular exhibition."

In a report bearing the same date (April 29, 1859), Professor Faraday stated his opinion "that Professor Holmes had practically established the fitness and sufficiency of the magneto-electric light for lighthouse purposes, so far as its nature and management were concerned;" that "the light produced was powerful beyond any other that he had yet seen so applied, and in principle might be accumulated to any degree;" that "its regularity in the lantern was great, its management easy, and its care might be confided to attentive keepers of the ordinary degree of intellect and knowledge." Again, on February 28, 1860, he reported to the Trinity House, after a subsequent experiment of six months' duration, that "the light has proved to be practicable and manageable, and has supplied the means of putting into a lighthouse lantern, for six months or longer, a source of illumination far surpassing in intensity and effect, any other previously so employed;" that he "did not know at what cost this result had been obtained, but that, unless that was very great indeed, he was of opinion that a large increase upon the expense of the old method (estimated upon the quantity of light obtained) ought to be permitted in the first establishment of a mode of illumination which apparently promised many improvements during its further development."

The simple mention of these facts, coupled with the favorable opinion of Professor Faraday, is sufficient to insure for this scheme the amount of attention which it deserves; and with the view of aiding the discussion upon this subject, we propose giving shortly a detailed account of the mechanical arrangements and mode of operation of Professor Holmes's magneto-electric apparatus.—*Chemical News*,

* Vide Chemical News, Vol. IV., p. 133.

ABSORPTION OF GASES BY CHARCOAL.

Some time ago, we alluded in a leading article to the sanitary properties of charcoal, and its power of absorbing gases. Dr. R. Angus Smith, in the proceedings of the Royal Society of London, has recently given the following results of his experiments on this subject:

Charcoal abstracts oxygen from atmospheric air at ordinary temperatures.

The absorption of oxygen continues for a long time, but the greater part takes place during the first part of the time the charcoal and air are in contact.

Hydrogen, nitrogen, or carbonic acid, are not absorbed at the same time as oxygen, from gaseous mixtures.

The amount of gas absorbed by charcoal is in some degree proportionate to the condensibility of the gas; but this is not the only determining circumstance, in the case of oxygen at least.

The separation of oxygen that is absorbed by charcoal cannot be effected without production of carbonic acid, even at 212° F., and more slowly at lower temperatures.

The absorptive power of charcoal differs for different kinds very much, so does the capability of combining with oxygen; animal charcoal excels wood charcoal, in this respect.

Nitrogen and hydrogen absorbed by charcoal, diffuse into an atmosphere of other gases with a force equal to a three-quarter inch column of mercury.

Water expels mercury from the pores of charcoal instantaneously.

Dr. Smith concludes from his observations:

That the selective character of porous bodies may be closely related to—

1. The condensibility of gases;
2. Attraction, and perhaps tendency to combine;
3. Capacity of combination.

That in any case the attraction which determines the condensation of a gas is exercised at a distance greater than the distance of the atoms or molecules in combination.

That the gases in porous bodies lie in concentric strata, around the particles of the solid, which strata are unequally attracted according to their distance.

* Phil. Mag., xxv., 364.

That chemical attraction cannot be distinguished from physical attraction, though attraction may exist without effecting its ultimate result of combination, and that the influence of mass upon chemical action may be due to this connection.

That there is no evidence of the existence of a specific attractive force determining chemical change, but only evidence of combination.

Mr. Hunter, of Queen's College, Belfast, has also published some results relating to this subject. * He has adopted the method employed by De Saussure. The charcoal was heated to redness before each experiment, and, while incandescent, plunged into the dry gas confined by mercury. The absorption generally terminated at the end of twenty-four hours. The results obtained were as follows, for a temperature of 0° C., and pressure of 760 mm.:

	Ammonia.		Carbonic Acid.		Cyanogen.	
	Vol. absorbed reduced to 0° C and 760 mm.		Vol. absorbed reduced to 0° C. and 760 mm.		Vol. absorbed reduced to 0° C. and 760 mm.	
	Experiment.	Mean.	Experiment.	Mean.	Experiment.	Mean.
Logwood	112.4 111.3 110.1	111.3	58.1 56.2	54.6	87.3	
Ebony	106.6 104.4 108.7	106.7	46.6 50 3 44.0	47.0	89.6	
Camwood	93.0 89.5	91.2	44.7 51.3 44 7	48.4		
Green Ebony	96.0 84.6	90.3	37.4 44.8 41.3	40.8		
Fustic (Cuba)	89.7 89.1 88.2	89.6	61.7 54.9	58.0		
Lignum Vitæ	89.2 83.0	89.0	47.2	47.2		
Boxwood	86.6 84.5	85.6	31.2 31.2 30.2	31.2	28.8	
Jamaica logwood	65.0 73.8	69.5	33.3	33.3		
Sapan wood	69.9 69.8	69.9	32.2	32.2		
Beech	54.6 61.3	58.0				
Rosewood	50.6	50.6				
Westaria Sinensis	44.03	44.03				
Vegetable ivory			47.5 58.6 50.3	50.5	57.3	

The absorption was found to be very rapid in cases where the quantity of gas absorbed is large. The differences in the amount of absorption, sometimes considerable, are considered to be in part due to differences in the pieces of charcoal. In order to ascertain the influence of long-continued heating on the absorptive power of charcoal, a piece of boxwood charcoal was kept at a strong red heat for more than an hour. Its absorption was then found to be 79, while in the ordinary way of heating it was 85. It would appear from these results that different kinds of charcoal differ in their absorptive power for different gases. Logwood charcoal absorbs most ammonia; fustic charcoal most carbonic acid; and ebony charcoal most cyanogen.

OUR TABLES OF THE GAS COMPANIES.—We again call the special attention of gas engineers to our tables of the gas-light companies, and earnestly request them to examine the figures placed opposite the names of their respective companies, and inform us of any errors which may appear. We repeat this request because of our strong desire to have the tables perfect in every detail. Officers of gas companies will therefor confer a favor by complying with our wishes. We would like to be particularly informed of any recent changes in the price of gas, and whether any companies charge the excise tax to consumers.

GAS-LIGHT COMPANIES IN THE UNITED STATES.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

No.	Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1	1857	Adrian	Mich.	50,000	50	—	May & November.	4,000	3 50	.....	....	
2	1856	Akron	O.	20,000	33⅓	—	Do.	3,500	3 00	....	....	
3	1845	Albany	N. Y.	25 ,000	20	4	January & July.	65,000	3 00	120	....	None in market.
4	1858	Albion	N. Y.	30,000	100	—	Do.	3,000	3 80	....	....	
5	1851	Alexandria	Va.	106,530	—	—	City Works.	9,000	3 50	....	....	
6	1852	Alleghany	Pa.	200,000	25	4	May & November.	25,000	3 00	....	....	
7	1853	Allentown	Pa.	60,000	100	3½	Do.	5,000	3 50	....	....	
8	1857	Alton	Ill.	75,000	—	—	Private Works.	4,000	3 50	....	....	
9	1859	Altoona	Pa.	40,000	20	4	January & July.	5,000	3 00	....	....	
10	1859	Amesbury and Salisbury	Mass.	30,000	25	—	Do.	7,000	4 00	....	....	
11	1858	Annapolis	Md.	100,000	25	—	Do.	4,000	4 00	....	....	
12	1858	Ann Arbor	Mich.	23,000	50	5	March & September.	5,500	4 00	....	....	
13	1858	Astoria	N. Y.	20,000	50	—	Do.	6,000	4 00	....	....	
14	1855	Atlanta	Ga.	50,000	25	5	January & July.	12,000	5 00	....	....	
15	1857	Attleboro'	Mass.	6,000	50	3	Do.	2,000	6 00	....	....	
16	1850	Auburn	N. Y.	80,000	50	5	Do.	10,000	7 00	....	....	
17	1851	Augusta	Ga.	80,000	25	8	Do.	9,000	6 00	....	....	
18	1853	Augusta and Hallowell	Me.	84,700	50	5	Do.	10,000	4 00	....	....	
19	1860	Aurora	Ind.	10,000	—	—	Private Works.	3 500	3 50	....	....	Formerly used Sanders' Water-Gas. Recently altered to Coal Gas-Works.
20	1847	Baltimore	Md.	550,000	100	5	June & December.	150.000	2 50	150	....	None for sale.
1	1852	Bangor	Me.	120,000	100	4	January & July.	12,000	3 50	....	....	
2	1855	Batavia	N. Y.	32,000	20	4	Do.	2,500	4 00	....	....	
3	1853	Bath	Me.	65,000	100	3	April & October.	10,000	3 75	....	....	
4	1859	Bath	N. Y.	15,000	50	—	May & November.	3,000	7 00	....	....	
5	1861	Battle Creek	Mich.	15,000	—	—	January & July.			....	....	
6	1858	Belfast	Me.	14,000	100	—	Do.	7,000	7 00	....	....	
7	1856	Bellefont	Pa.	20,000	25	2	Do.	3,500	4 00	....	....	
8		Beloit	Wis.	30,000	—	—	Do.	4,000	4 00	....	....	
9	1854	Bethlehem	Pa.	50,000	50	4	June & December.	2,000	3 20	....	....	
30	1859	Beverly	Mass.	40,000	100	—	January & July.	4,000	4 00	....	....	
1	1853	Binghampton	N. Y.	50,000	50	3½	Do.	10,000	4 00	....	....	
2	1859	Birmingham	Pa.	40,000	50	—	Do.	4,000	4 00	....	....	
3	1855	Bloomington	Ill.	40,000	50	—	Do.	6,000	4 00	....	....	
4	1853	Bordentown	N. J.	50,000	25	3	June & December.	4,000	3 80	....	....	
5	1822	Boston	Mass.	1,000,000	500	5	Do.	130,000	2 25	....	....	
6	1859	Brattleboro'	Vt.	21 000	—	—	Do.	3,000	4 00	....	....	
7	1851	Bridgeport	Ct.	90,000	25	4	January & July.	10,000	4 00	90	....	Passed last dividend.
8	1857	Bridgeton	N. J.	50,000	20	—	Do.	5,000	4 00	....	....	
9	1856	Bristol	Pa.	30,000	25	3	February & August.	3,000	4 00	....	....	
40	1855	Bristol	R. I.	25,000	50	2	January & July.	6,000	4 00	....	....	
1	1859	Brockport	N. Y.	25,000	100	3	Do.	1 500	4 00	....	....	
2	1858	Brookline	Mass.	66,000	100	4	February & August.	3,500	4 00	....	....	
3	1825	Brooklyn	N. Y.	2,000,000	25	5	January & July.	75,000	2 50	170	160	
4		Brownsville	Pa				Do.			....	....	
5	1848	Buffalo	N. Y.	600,000	50	5	Do.	70,000	3 00	140	125	
6	1852	Burlington	N. J.	100 000	25	3½	Do.	5,000	4 00	105	....	
7	1853	Burlington	Vt.	75,000	25	2½	Do.	10,000	4 50	....	....	
8	1859	Burlington	Iowa.	65,000	50	—	Do.	8,000	4 00	....	....	
9	1861	Calais	Me.	90,000	100	—	Do.	10,000	3 50	....	....	
50	1852	Cambridge	Mass.	300,000	100	5	February & August.	20,000	3 50	100	97½	
1	1852	Camden	N. J.	300,000	100	3	April & October.	15,000	3 50	105	100	
2	1853	Canandaigua	N. Y.	50,000	50	—	January & July.	3,000	4 00	90	80	
3	1856	Canton	O.	19,0 0	50	6	March & September.	6,000	3 00	....	....	
4	1853	Cape Island	N. J.	80,000	100	—	October.	10,000	6 00	....	....	Watering place,—These Works only run in summer.
5	1860	Carbondale	Pa.	16,000	25	—	March & September.	5,000	4 00	....	....	
6	1855	Carlisle	Pa.	30,000	25	—	January & July.	4,000	4 00	....	....	
7	1856	Catasauqua	Pa.	15,000	25	5	May & November.	2,000	4 00	....	....	
8	1858	Catskill	N. Y.	—	—	—	Private Works.	3,000	3 00	....	....	Owned by G. T. Sutton.
9	1857	Chambersburg	Pa.	30,000	25	—	January & July.	3,000	4 00	....	....	
60	1846	Charleston	S. C.	723,800	25	4	Do.	50,000	4 00	....	....	
1	1851	Charlestown	Mass.	200,000	50	4	Do.	30,000	3 00	105	....	
2	1858	Charlotte	N. C.	14,000	50	10	March & September.	3,500	6 00	....	....	
3	1859	Charlotteville	Vt.	15,000	25	—	Do.	4,000	4 50	....	....	
4	1851	Chelsea	Mass.	100,000	100	3½	January & July.	8,000	3 50	....	....	
5	1856	Chester	Pa.	35,000	25	3	April & October.	4,000	4 00	....	....	
6	1849	Chicago	Ill.	1,300,000	25	5	January & July.	100,000	2 50	150	140	Very scarce. Stock wanted.
7	1857	Chicopee	Mass.	50,000	20	—	Do.		4 00	....	....	
8	1851	Chillicothe	O.	40,000	25	4	Do.	12,000	3 50	....	....	
9	1841	Cincinnati	O.	1,600,000	100	5	Do.	225,000	2 50	....	....	
70	1859	Citizens', Brooklyn	N. Y.	1,000,000	20	—	Do.	135,000	2 00	128	125	
1		Clarkesville	Tenn.	100,000	50	—	Do.	5,000	4 00	....	....	
2	1860	Claremont	N. H.	20 000	100	—	March & September.	3,000	4 00	....	....	
3	1846	Cleveland	O.	200,000	10	5	January & July.	20,000	3 00	....	....	
4	1858	Clinton	Mass.	30,000	500	5	Do.	3,000	4 00	....	....	
5	1859	Clyde	N. Y.	10,000	50	4	Do.	2,500	4 00	....	....	
6	1854	Cohoes	N. Y.	50,000	20	3½	April & October.	5,000	3 60	....	....	
7	1860	Cold Spring	N. Y.	30,000	50	—	Do.	3,500	4 00	80	....	Formerly Rosin-Gas, but now Coal. A well managed company. Stock firmly held.
8	1860	Cold Water	Mich.	25,000	50	5	January & July.	4,000	4 00	....	....	
9	1852	Columbia	Pa.	37,500	25	—	Do.	4,000	3 50	....	....	
80	1852	Columbia	S. C.	44,000	25	4	Do.	6,000	6 00	....	....	
1	1857	Columbia	Cal.	50,000	25	—	Do.	4,500	10 00	....	....	
2	1858	Columbus	Ga.	54,000	25	5	Do.	5,000	7 00	....	....	
3	1850	Columbus	O.	100,000	10	6	Do.	30.000	3 00	....	....	
4	1858	Concond	N. H.	50,000	50	5	Do.	8,000	3 50	....	....	
5	1858	Covington and Newport	Ky.	100,000	50	3½	Do.	28,000	4 00	..	....	
6	1854	Cumberland	Md.	60,000	50	3	Do.	6,000	4 00	....	....	
7	1857	Danbury	Ct.	50,000	25	4	Do.	2,000	3 75	....	...	
8	1856	Danville	Pa.	30,000	25	—	June & December.	3 000	4 00	....	....	
9	1855	Davenport	Iowa.	56,000	100	—	Do.	6,000	5 00	....	....	
90	1848	Dayton	O.	50,000	25	5	February & August.	8,000	3 50	....	...	
1	1853	Dedham	Mass.	40,000	50	—	January & July.	3,000	4 00	....	....	
2	1860	Delaware	O.	30,000	25	—	Do.	2,500	3 00	....	....	
3	1849	Detroit	Mich.	500,000	50	5	Do.	30,000	3 50	160	150	Excellent Stock. No sales.
4	1860	Dobbs' Ferry	N. Y.	25,000	—	—	Do.	3,000	4 00	....	....	
5	1854	Dorchester	Mass.	150,000	100	—	Do.	14,000	4 00	....	....	
6	1859	Dover	Del.	12,000	—	—	Private Works.	2,000	4 00	....	....	
7		Dover	N. H.				January & July.			....	....	
8	1857	Doylestown	Pa.	50,000	—	—	Do.	3,000	4 00	....	....	
9	1854	Dubuque	Iowa.	100,000	50	—	Do.	17,000	4 50	....	....	
100	1853	East Boston	Mass.	133,000	25	4	Do.	20,000	3 50	....	145	No transactions.
1	1858	East Greenwich	R. I.	11,200	100	15	Do.	3,000	7 00	....	...	
2	1861	East Hampton	Mass.	10,000	25	—	Do.	5,000	9 00	....	....	
3	1861	East New York	N. Y.	50,000	50	—	Do.	12,000	3 50	....	....	
4	1857	Easton	Md.	9,000	10	—	Do.	1,500	7 00	....	....	
5	1850	Easton	Pa.	125,000	50	4	June & December.	6,000	3 60	....	....	
6	1856	Eastport	Me.	50,000	55	—	Do.	3,000	4 00	....	....	
7	1855	Elizabeth	N. J.	100,000	20	4	January & July.	14,000	3 50	....	....	
8		Ellicott's Mills	Md.	10,000	—	—	Do.	4,000	4 00	....	....	
9	1852	Elmira	N. Y.	50,000	25	3½	Do.	5,000	4 00	....	....	
110	1852	Erie	Pa.	68,000	50	3½	June & December.	10,000	3 00	....	...	
11	1853	Evansville	Ind.	60,000	50	4	January & July.	12,000	4 00	110	....	A very good Company.
12		Exeter	N. H.	60,000	—	—	Do.	12,000		.. ..	...	
13		Fair Haven	Ct.	20,000	25		Do.	8,000	4 00	....	....	
14	1847	Fall River	Mass.	26,000	—	—	Private Works.	12,000	3 50	....	....	
15	1859	Fayetteville	N. C.	25,000	100	6	January & July.	7,000	6 00	....	....	
16		Fifth Ward (Milwaukee)	Wis.	50,000	25	—	Do.	10,000	4 00	....	....	
17	1857	Fishkill	N. Y.	10,000	20	—	April & October.	1,500	9 00	....	....	
18	1853	Fitchburg	Mass.	100,000	50	3	January & July.	5,000	4 00	....	....	Make Petroleum-Gas.
19	1859	Flemington	N J.	20,000	—	—	Do.	3,000	4 00	....	....	
120	1855	Flushing	N. Y.	40,000	50	1½	March & September.	6,500	4 00	....	....	
21	1858	Fort Wayne	Ind.	50,000	25	—	Do.	6,000	4 00	....	....	
22	1851	Frankfort	Ky.	30,000	—	—	City Works.	5,500	4 50	...	....	
23	1851	Frederick City	Md.	36,000	100	—	January & July.	5,000	6 70	....	....	
24	1854	Fredericksburg	Va.	72,500	50	5	Do.	4,500	4 00	....	....	
25	1858	Fredonia (Natural Gas)	N. Y.	10,000	100	—	Do.	2,000	4 00	....	....	Unlimited supply of Natural Gas.
26	1856	Freeport	Ill.	20,000	100	—	May & November.	10,000	4 00	....	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

No.	Chartered	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
127	1859	Fremont	O.	25,000	25	—	May & November.	2,000	4 50	....	....	
28	1858	Fulton	N. Y.	12,000	100	—	Do.	4,000	7 00	....	....	
29	1855	Galena	Ill.	70,000	100	—	Do.	8,000	4 00	....	....	
130	1859	Galion	O.	25,000	25	—	January & July.	1,800	3 00	....	....	
31	1858	Galveston	Texas.	150,000	50	—	May & November.	7,000	6 00	....	....	
32	1854	Gardiner	Me.	100,000	50	4	Do.	8,000	4 00	....	....	
33	1853	Geneva	N. Y.	75,000	25	2½	Do.	6,000	4 00	....	....	
34	1851	Germantown	Pa.	Merged	into	the	Philadelphia Works.	12,000	2 25	....	....	
35	1859	Gettysburg	Pa.	20,000	50	3	January & July.	2,500	4 00	....	....	
36	1854	Glenn's Falls	N. Y.	85,000	50	3	February & August.	4,000	4 00	....	....	
37	1854	Gloucester	Mass.	40,000	50	—	January & July.	5,000	3 50	....	....	
38	1857	Gloversville	N. Y.	15,000	25	—	Do.	3,000	3 50	....	....	
39	1858	Grand Rapids	Mich.	50,000	20	—	Do.	3,000	4 00	....	....	
140	1855	Great Barrington	Mass.	5,000	100	5	April & October.	2,000	7 00	....	....	
41	1849	Great Falls	N. H.	50,000	100	3	Do.	3,000	4 00	...	....	
42	1860	Greenfield	Mass.	20,000	50	2	January & July.	2,500	4 00	....	....	
43	1858	Greenpoint	N. Y.	100,000	50	5	Do.	20,000	3 00	....	....	Close corporation.
44	1859	Greensboro'	N. C.	12,000	50	—	April & October.	3,000	7 00	....	....	
45	1858	Greensburg	Pa.	30,000	25	3	May & November.	2,000	3 00	....	....	
46	1854	Hagerstown	Md.	15,000	20	—	January & July.	2,000	6 00	....	....	
47		Hamilton	O.	15,000			Do.			....	....	
48	1859	Hannibal	Mo.	100,000	100	—	Do.	6,000	3 50	....	....	
49	1857	Harlem	N. Y.	350,000	50	3½	Do.	25,000	3 00	....	145	
150	1855	Harrisburg	Pa.	100,000	—	4	Do.	5,000	4 00	....	....	
51	1849	Hartford	Ct.	200,000	25	4	Do.	25,000	3 00	150	140	Stock in demand.
52		Hastings	N. Y.				Do.	8,000	4 00	..	....	
53	1853	Haverhill	Mass.	50,000	50	—	Do.	5,000	4 00	....	....	
54	1859	Haverstraw	N. Y.	20,000	100	—	Do.	5,000	4 00	....	....	
55	1861	Hayesville	Mass.	15,000	25		Do.	4,000	4 00	....	....	
56	1859	Hempstead	N. Y.	16,000	25	—	Do.	1,000	4 00	....	....	
57	1862	Hoboken	N. J.	100,000	25	3	Do.	30,000	2 50	....	100	Works not yet built.
58	1856	Hollidaysburg	Pa.	30,000	25	2	Do.	4,000	3 50	....	....	
59	1861	Holyoke	Mass.	20,000	25	—	Do.	8,000	4 00	....	....	
160	1861	Homer & Cortlandt	N. Y.	40,000	100	—	Do.	6,000	4 00	....	....	
61	1854	Honesdale	Pa.	30,000	25	3	Do.	2,500	4 00	....	....	
62	1860	Hornellsville	N. Y.	12,000	50	—	Do.	2,000	4 00	....	....	
63	1858	Hudson	N. Y.	50,000	100	3½	February & August.	3,000	4 00	....	....	
64	1857	Huntington	Pa.	18,000	50	3	Do.	2,000	3 50	....	....	
65	1856	Huntsville	Ala.	7,325	25	—	June & December.	2,000	5 00	....	....	
66		Indianapolis	Ind.	150,000	—	—	Do.	15,000	5 00	....	....	
67	1857	Iowa City	Iowa.	40,000	50	—	February & August.	4,000	4 50	....	....	
68	1852	Ithaca	N. Y.	75,000	25	3½	January & July.	6,000	4 00	....	....	
69	1857	Jackson	Mich.	25,000	50	5	Do.	6,000	3 50	....	....	
170		Jackson	Miss.	80,000	50	—	Do.	4,000	4 50	....	....	
71		Jackson	Cal.	50,000	30	—	Do.	4,000	10 00	....	....	
72		Jacksonville	Flor.	30,000	20	—	Do.	2,000	7 00	....	....	
73		Jacksonville	Ind.	50,000	50	—	Do.	4,000	5 00	....	....	
74	1858	Jacksonville	Mo.	25,000	25	—	Do.	7,000	6 00	....	....	
75	1856	Jamaica	N. Y.	20,000	—	4	Do.	6,000	4 00	....	....	
76	1858	Jamaica Plain	Mass.	10,000	100	4	Do.	3,000	4 00	....	....	
77		Jamestown	N. Y.	25,000	—	—	Do.	4,000	4 00	....	....	
78	1856	Janesville	Wis.	50,000	100	—	Do.	12,000	4 00	....	....	
79		Jeffersonville	Md.	30,000	25		Do.	4,000	4 00	....	....	
180	1853	Jersey City	N. J.	300,000	—	5	Do.	30,000	3 00	150	....	No sales since formation of Hoboken Co.
81	1858	Jersey Shore	Pa.	15,000	25	—	Do.	2,000	3 70	....	....	
82	1856	Johnstown	Pa.	50,000	25	3	Do.	8,000	3 00	....	....	
83	1857	Joliet	Ill.	300,000	100	—	June & December.	6,000	4 00	....	....	
84	1858	Kalamazoo	Mich.	30,000	50	5	Do.	10,000	4 00	....	....	
85	1860	Keene	N. H.	60,000	100	—	Do.	4,500	4 00	....	....	
86	1855	Keokuk	Iowa.	100,000	100	—	January & July.	10,000	4 50	....	....	
87	1855	Kingston	Pa.	50,000	50	—	Do.	3,000	4 00	....	....	
88	1859	Kittanning	Pa.	20,000	—	—	Doubtful.	5,000	4 00	....	....	Said to be a fraud.
89	1854	Knoxville	Tenn.	63,000	—	—	April & October.	4,000	5 00	....	....	
190	1860	Laconia	N. H.	20,000	100	—	Do.	4,000	6 00	....	....	
91	1859	La Crosse City	Wis.	100,000	50	—	June & December.	10,000	5 00	....	....	
92	1854	Lafayette	Ind.	60,000	50	4	January & July.	10,000	3 25	....	....	
93	1856	Lambertville	N. J.	30,000	25	—	Do.	2,600	4 00	....	....	
94	1849	Lancaster	Pa.	100,000	50	4	Do.	10,000	3 00	....	....	
95	1856	Lancaster	O.	25,000	100	5	Do.	5,000	3 50	....	....	
96	1855	Lansinburg	N. Y.	25,000	100	—	Private Works.	7,000	4 00	....	....	
97	1849	Lawrence	Mass.	200,000	100	4	February & August.	15,000	3 50	....	....	
98	1859	Leavenworth	Kansas.	200,000	25	—	January & July.	10,000	5 00	....	....	
99	1856	Lebanon	Pa.	26,000	50	—	February & August.	5,000	4 00	....	....	
200	1861	Le Roy	N. Y.	25,000	50	—	Do.	4,000	4 00	....	....	
1	1858	Lewisburg	Pa.	20,000	100	—	January & July.	4,000	4 00	....	...	
2	1852	Lewiston	Me.	100,000	100	3	Do	10,000	3 20	....	....	
3	1856	Lewistown	Pa.	30,000	50	3	April & October.	3,000	3 10	....	....	
4	1853	Lexington	Ky.	100,000	25	4	January & July.	5,000	4 00	....	....	
5	1853	Little Falls	N. Y.	112,000	25	—	Do.	3,500	7 00	....	....	
6	1861	Little Rock	Ark.	20,000	—	—	Do.	5,000	6 00	....	....	
7	1858	Lockhaven	Pa.	28,000	—	—	Do.	3,000	4 00	....	....	
8		Lockport	N. Y.	100,000	50	—	Do.	4,000	4 00	.. .	....	
9	1838	Louisville	Ky.	600,000	50	6	Do.	80,000	2 50	125	....	But $481,400 stock has been sold. This Company has a large contingent fund and undivided profit on hand.
210	1849	Lowell	Mass.	200,000	25	5	Do.	50,000	3 25	....	....	
11	1852	Lynchburg	Va.	70,000	25	5	Do.	6,000	3 80	....	....	
12	1852	Lynn	Mass.	55,000	50	4	Do.	20,000	4 00	....	....	
13	1859	Lyons	N. Y.	30,000	100	—	Do.	4,000	4 00	....	....	
14	1852	Macon	Ga.	75,160	25	6	Do.	5,000	5 00	....	....	
15	1851	Madison	Ind.	160,000	25	3	Do.	10,100	3 50	....	....	
16	1855	Madison	Wis.	100,000	25	—	Do.	5,000	5 00	....	....	
17	1854	Malden & Melrose	Mass.	50,600	25	3	February & August.	5,000	4 00	....	....	
18	1852	Manayunk	Pa.	40,000	100	—	Do.	7,000	4 00	....	....	
19	1852	Manchester	N. H.	100,000	100	5	January & July.	25,600	3 00	....	....	
220	1830	Manhattan (N. Y. City)	N. Y.	4,000,000	50	5	Do.	600,000	2 50	300	375	
21		Mansfield	O.	25,000	—	—	Do.	10,000	4 00	....	....	
22	1854	Marblehead	Mass.	40,000	100	3	Do.	1,000	4 00	....	....	
23		Marlboro'	Mass.	20,000	—	—	Do.	8,000	4 00	....	....	
24		Mauch Chunk	Pa.	50,000	50	—	Do.	7,000	4 00	....	....	
25	1857	Marietta	O.	50,000	50	—	Do.	7,000	4 00	....	....	
26	1858	Marysville	Cal.	50,000	100	—	Do.	4,000	12 50	....	....	
27	1857	Massilon	O.	20,000	25	—	Do.	5,000	3 00	....	....	
28	1855	Meadville	Pa.	39,500	25	—	Do.	4,000	3 50	....	....	
29		Medina	N. Y.	2,000	100	—	Do.	2,000	7 00	....	....	
230	1852	Memphis	Tenn.	300,000	100	5	June & December.	12,000	3 50	....	....	
31		Meriden	Ct.	20,000			Do.			....	....	
32	1859	Metropolitan (N. Y. City)	N. Y.	1,000,000	100	—	January & July.	200,000	2 50	....	....	
33	1859	Middleboro'	Mass.	15,000	—	—	Private Works.		6 00	....	....	
34	1853	Middletown	Ct.	50,000	25	3	March & September.	5,000	3 80	....	....	
35		Middletown	N. Y.		25	—	Private Works.	3,000	3 00	...	....	Owned by G. T. Sutton.
36		Milford	Mass.	20,000	—	—	Do.		4 00	....	....	
37		Milledgeville	Ga.	100,000	50	—	Do.		5 00	....	....	
38		Milton	Pa.	10,000			Do.			....	....	
39	1847	Milwaukee	Wis.	400,000	50	5	January & July.	24,000	3 50	150	....	
240	1852	Mobile	Ala.	200,000	—	—	Do.	30,000	4 50	....	....	
41	1836	Monroe	Mich.	40,000	50	—	Do.	5,000	3 50	50	....	
42	1852	Montgomery	Ala.	100,000	25	4	February & August.	7,000	6 00	....	....	
43	1856	Montpelier	Vt.	30,000	25	3	January & July.	5,000	4 50	....	....	
44	1859	Morrisania	N. Y.	30,000	50	—	Do.		4 00	....	....	
45	1859	Morristown	N. J.	18,000	50	—	Do.	3,500	4 00	....	....	
46	1854	Mount Holly	N. J.	16,650	25	3	April & October.	2,000	7 00	....	....	
47		Mount Vernon	O.	50,000	100	—	Do.		4 00	....	....	
48	1857	Muscatine	Iowa.	50,000	100	—	January & July.	3,000	4 50	...	....	
49	1854	Nantucket	Mass.	50,000	100	3	February & August.	6,000	4 00	....	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

No.	Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
250	1852	Nashua	N. H.	45,000	50	3½	January & July.	10,000	3 50	....	....	
51	1850	Nashville	Tenn.	200,000	50	5	Do.	25,000	3 50	....	....	
52	1858	Natchez	Miss.	46,000	50	—	Do.	20,000	5 00	....	....	
53	1852	New Albany	Ind.	200,000	50	3½	Do.	16,000	3 50	....	....	
54	1846	Newark	N. J.	362,000	50	5	Do.	45,000	3 62	130	....	Always a favorite stock.
55	1856	Newark	O.	30,000	100	—	Do.	7,000	5 40	....	....	
56	1852	New Bedford	Mass.	130 000	100	5	Do.	15,000	2 90	102	....	Well managed and kept quiet.
57	1859	Newbern	N. C.	22,000	100	6	Do.	6,000	3 50	....	....	
58		New Britain	Ct.	30,000	20	5	Do.	3,000	4 00	....	....	
59	1851	New Brunswick	N. J.	100,000	20	4	Do.	8,000	3 00	115	....	
250	1852	Newburg	N. Y.	67,000	20	4	Do.	10,000	4 00	105	....	
61	1852	Newburyport	Mass.	150,000	10]	4	Do.	9,000	4 00	92½	....	
62	1857	Newcastle	Del.	32,300	10	3	Do.	4,000	4 00	90	....	
63	1847	New Haven	Ct.	250,000	25	4	Do.	30,000	3 00	155	....	None in market.
64	1853	New London	Ct.	70,000	50	3	Do.	12,000	4 00	105	....	Do.
65	1835	New Orleans	La.	1,500,000	100	6	Do.	120,000	4 50	180	....	
66	1853	Newport	R. I.	130,200	100	4	Do.	10,000	3 50	112	....	
67	1854	Newton & Watertown	Mass.	800,000	100	2	Do.	10,000	4 00	....	....	
68		Newton	N. J.	30,000	—	—	Do.	3,000	4 00	....	....	
69		Newton	Pa.	20,000	50	—	Do.	2,500	4 00	....	....	
270	1823	New York	N. Y.	1,000 000	50	5	May & November.	100,000	2 50	300	....	
71	1859	Niagara Falls	N. Y.	15,000	25	—	Do.	3,000	4 00	90	....	
72		Norfolk	Va.	60,000	25	—	Do.	40,000	4 00	....	....	
73	1853	Norristown	Pa.	41,700	25	4	June & December.	8,000	3 50	....	....	
74	1855	North Attlkboro'	Mass.	50,000	100	3	Do.	6,000	4 00	....	....	
75		Northern Liberties	Pa.	400,000	25	7½	City Works.	40,000	2 50	....	....	
76		North Adams	Mass.	25,000	—	—	March & September.	30,000	4 00	....	....	
77	1856	Northampton	Mass.	35,000	25	3	January & July.	4,500	4 00	....	....	
78	1859	North Bridgewater	Mass.	16,000	100	4	June & December.	1,000	7 00	....	....	
79	1856	Norwalk	Ct.	30,000	150	4	February & August.	6,000	4 00	....	....	
80	1859	Norwalk	O.	30,000	25	—	January & July.	4,000	4 00	....	....	
281	1854	Norwich	Ct.	75,000	25	3½	Do.	12,000	3 50	....	....	
82	1861	Norwich	N. Y.	12,000	50	—	Do.	2,500	4 00	....	....	
83	1859	Nyack	N Y.	20,000	100	—	Do.	2,500	4 00	....	....	
84	1860	Oberlin	O.	10,000	—	—	Do	1,200	4 00	....	....	
85	1855	Ogdensburg	N. Y.	75,000	50	5	Do.]	9,000	4 00	....	....	
86	1859	Orange	N. J.	65,000	25	—	Do.	6,000	3 50	....	....	
87	1852	Oswego	N. Y.	81,250	100	3½	Do.	15,000	4 00	105	....	Good works, built by Hoy, Jr., & Kennedy.
88	1855	Ottawa	Ill.	45,000	100	6½	Do.	6,000	4 00	....	....	
89	1856	Owego	N. Y.	40,000	50	3½	Do.	5,000	4 00	....	....	
290	1860	Owensboro'	Ky.	25,000	25	—	Do.	4,000	3 50	....	....	
91	1856	Paducah	Ky.	75,000	100	—	May & November.	4,000	5 00	....	....	
92	1861	Painsville	O.	40,000	25	5	Do.	2,500	5 00	....	....	
93	1856	Palmyra	N. Y.	12,000	25	—	January & July.	3,000	7 00	....	....	
94	1847	Paterson	N. J.	125,000	25	3	Do.	20,000	3 50	95	....	Surplus $10,000, May 15, 1863.
95	1850	Pawtucket	R I.	75,000	50	4	Do.	12 000	3 00	....	....	Works leased to Gilbert T. Sutton.
96	1855	Peekskill	N. Y.	31,000	50	3	June & December.	4,000	4 00	....	....	
97	1860	Penn Yan	N. Y.	12,000	50	5	Do.	3,000	4 00	....	....	What is this Company doing?
98	1859	Peoples', Chicago	Ill.	500,000	50	New	Do.	100,000	2 50	....	....	
99	1855	Peoria	Ill.	100,000	50	4	Do.	8,000	3 50	....	....	
300	1852	Petersburg	Va.	120,000	—	5	January & July.	20,000	3 80	....	....	
1	1841	Philadelphia	Pa.	3,000,000	50	—	City Works.	650,000	2 00	....	....	
2	1855	Piqua	O.	50,000	50	—	January & July.	6,500	4 00	....	....	
3	1835	Pittsburg	Pa.	300,000	100	5	Do.	60,000	1 50	115	....	
4	1854	Pittsfield	Mass.	50,000	100	5	Do.	4,500	4 00	....	....	
5	1858	Placerville	Cal	30,000	50	—	Do.	4,500	10 00	....	....	
6	1860	Plainfield	N. J.	25,000	50	—	Do.	2,500	4 00	....	....	
7	1859	Plattsburg	N. Y.	16,000	50	—	January & July.	5,000	7 00	....	....	
8	1853	Plymouth	Mass.	40,000	100	—	April & October.	8,000	4 00	....	....	
9	1860	Port Chester	N. Y.	50,000	50	—	Do.	4,000	4 00	....	....	
310	1860	Port Jervis	N. Y.	20,000	100	—	Do.	3,000	4 10	....	....	
11	1849	Portland	Me.	300,000	50	4	January & July	30,000	3 00	....	....	
12	1859	Portland	Oreg.	50,000	50	—	Do.	3,500	8 00	....	....	
1	1859	Port Lavacca	Texas.	50,000	100	—	Do.	2,500	7 00	....	....	
14	1851	Portsmouth	N. H.	70,000	100	8	April & October.	6,500	3 70	....	....	
15	1855	Portsmouth	O.	50,000	50	4	January & July.	10.000	3 50	....	....	
16	1855	Portsmouth	Va.	100,000	50	4	Do.	4,000	4 00	....	....	
17	1852	Pottstown	Pa.	20,000	50	3	Do.	3,500	4 00	....	....	
18	1850	Pottsville	Pa.	110,000	50	2	Do.	10,000	3 50	....	....	
19	1850	Poughkeepsie	N. Y.	84,000	25	4	March & September.	15,000	3 50	120	110	
320	1848	Providence	R. I.	1,000,000	50	4	January & July.	60,000	3 00	122	....	
21	1853	Quincy	Ill.	300,000	50	4	June & December.	12,000	3 50	....	....	
22		Quincy	Mass.	00,000	00	—	Do.	00,0 0	0 00	....	....	
23	1855	Racine	Wis.	43,500	26	—	Do.	7,000	3 50	....	....	
24	1857	Rahway	N. J.	50,000	20	—	January & July.	5,000	4 00	....	....	
25	1858	Raleigh	N. C.	25,000	100	6	May & Novrmber.	5,000	6 00	....	....	
26	1848	Reading	Pa.	100,000	25	4	January & July.	25,000	3 00	....	....	
27	1851	Richmond	Va.	341,975	—	—	City Works.	30,000	3 00	....	....	Jeff. Davis has extinguished the gas-lights of Richmond, Va.
28	1859	Richmond	Mass.	40,000	25	—	January & July.	3,000	4 00	....	....	
29	1859	Ripley	O.	30,000	50	—	Do	2,000	4 50	....	....	
330	1852	Rochester	N. Y.	200,000	50	5	Do.	50,000	2 50	....	....	
31	1857	Rockford	Ill.	40,000	50	—	Do.	4,000	4 00	....	....	
32	1854	Rock Island	Ill.	100,000	50	—	Do.	6,000	4 50	....	....	
33	1854	Rockland	Me.	50,000	100	—	Do.	6,000	4 40	....	....	
34	1852	Rome	N. Y.	85,000	100	3½	Do.	10,000	3 60	....	....	
35	1854	Rondout and Kingston	N. Y.	65,150	20	3½	June & December.	10,000	3 80	....	....	
36	1854	Roxbury	Mass.	150,000	100	5	January & July.	20,000	3 50	....	....	
37	1859	Rutland	Vt.	20,000	25	—	Do.	4,000	3 50	....	....	
38		Saco	Me.	71,600	100	3½	April & October.	8,000	4 00	....	....	
39	1857	Sacramento	Cal.	500,000	100	—	Do.	40,000	10 00	....	....	
340	1859	Sag Harbor	N. Y.	20,000	—	—	Do.	4,000	4 00	....	....	
41	1858	Saint Albans	Vt.	15,000	20	—	Do.	3,000	7 00	....	....	
42		Saint Johnsbury	Vt.	30,000	25	—	Do.	4,000	4 00	....	....	
43	1857	Saint Joseph	Mo.	50,000	100	5	January & July.	6,000	5 00	....	....	
44	1859	Saint Louis	Mo.	600.000	50	—	June & December.	180.000	3 50	....	....	
45	1857	Saint Paul	Min.	200,000	50	3	January & July.	10.000	6 00	....	....	Surplus $10,000, May 15, 1863.
46	1856	Salem	N. J.	30,000	25	3	Do.	5,000	3 86	....	....	
47	1850	Salem	Mass.	200,000	100	4	February & August.	30,000	3 24	....	....	
48	1859	Salem	O.	25,000	20	—	Do.	3,000	3 00	....	....	
49	1859	Salisbury	N. C.	14,600	50	6	May & November.	3,500	6 00	....	....	
350		Salisbury Mills	Mass.	1,250	25	—	Do.	3,000	4 00	....	....	
51		Salmon Falls	Me.	25,000	100	—	Do.	3,000	4 00	....	....	
52		San Antonio	Texas.	75,000	20	—	Do.	40,000	6 00	....	....	
53		San Diego	Cal.	30,000	50	—	Do.	50,000	10 00	....	....	
54	1854	Sandusky	O.	75,000	50	—	April & October.	9,000	3 00	....	....	
55	1859	Sandwich	Mass.	10,000	—	—	Private Works.	2,000	3 50	....	....	
56	1852	San Francisco	Cal.	1,000,000	100	6	Do.	50,000	8 00	110	....	
57	1853	Saratoga Springs	N. Y.	39,000	100	—	January & July.	6,000	3 60	70	....	
58		Saugerties	N. Y.	30,000	20	—	Do.	4,000	3 00	....	....	
59	1849	Savannah	Ga.	200,000	25	5	Do.	10,000	3 75	....	....	
360	1851	Schenectady	N. Y.	50,000	—	—	Private Works.	11,000	4 00	....	....	
61	1858	Scranton, Gas and Water.	Pa.	100,000	25	—	January & July.	6,000	3 80	....	....	About trying Water-Gas.
62	1857	Selma	Ala.	20,000	100	—	Do.	2,000	5 00	....	....	
63	1856	Seneca Falls and Waterloo	N. Y.	80,000	50	3	Do.	10,000	4 00	100	....	
64		Shreveport	La.	40,000	25	—	Do.	3,000	0 50	....	....	
65	1856	Sing Sing	N. Y.	40,000	100	—	Do.	3,000	4 00	....	....	
66		Smyrna	Del.						4 00	....	....	Petroleum Gas.
67	1860	South Adams	Mass.	10,000	25	—	Do.	3,000	4 00	....	....	
68	1859	South Bridge	Mass.	5,000	25	—	Do.	4,010	6 00	....	....	
69		South Boston	Mass.	200.000	50	—	Do.	60,000	3 25	110	....	
370		Springfield	O.	200,000	100	—	Do	20,000	3 50	....	....	
71	1854	Springfield	Ill.	75,000	50	—	January & July.	10,000	3 50	....	....	
72	1848	Springfield	Mass.	100,000	500	5	February & August.	10,000	3 60	140	....	
73	1855	Stamford	Ct.	6,250	25	5	April & October.	3,000	3 50	....	....	
74	1857	Staten Island	N. Y.	150,000	50	5	January & July.	26,000	4 00	95	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

No.	Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
375	1859	Staunton	Va.	18,000	50	6	January & July.	4,000	7 00	....	....	
76		Steubenville	O.	150,000	100	—	Do.	15,000	4 00	....	....	
77		Stockton	Cal.	50,000	—	—	Do.	8,000	10 00		....	
78	1848	Syracuse	N. Y.	125,000	25	5	March & September.	25,000	3 00	112	....	
79		Tamaqua	Pa.	40,000	25	—	Do.	3,000	4 00	...	....	
380	1859	Tarrytown and Irvington	N. Y.	70,000	50	—	January & July.	3,000	4 00	....	....	
81	1853	Taunton	Mass.	100,000	50	4	Do.	10,000	4 00	....	....	
82		Terre Haute	Ind.	100,000	100	—	Do.	3,000	4 00	....	....	
83		Thompsonville	Ct.	25,000	50	—	Do.	4,000	4 50	....	....	
84		Tiffin	O.	25,000	20	—	Do.	4,000	4 00	....	....	
85	1853	Toledo	O.	100,000	50	3	Do.	8,000	3 50	....	....	
86	1847	Trenton	N. J.	100,000	20	4	Do.	15,000	3 60	....	110	
87	1848	Troy	N. Y.	200,000	100	4	June & December.	35,000	3 60	160	....	
88	1856	Urbana	O.	30,000	25	—	April & October.	3,500	4 00	....	....	
89	1849	Utica	N. Y.	80,000	100	4	Do.	22,000	3 60	....	....	
390	1853	Vicksburg	Miss.	66,000	50	—	March & September.	4,000	4 50	....	....	
91	1859	Vincennes	Ind.	25,000	100	—	January & July.	2,000	4 00	....	....	
92	1858	Walden	N. Y.	2,500	—	—	Private Works.	1,000	6 00	....	....	
93	1853	Waltham	Mass.	100,000	100	4	January & July.	3,000	4 00	....	....	
94	1857	Ware	Mass.	30,000	20	—	Do.	3,500	4 00	....	....	
95	1861	Warren	O.	30,000	50	—	Do.	4,000	3 00	....	....	
96	1854	Warren	R. I.	20,000	25	—	Do.	3,000	4 00	....	....	
97	1855	Washington	D. C.	500,000	20	5	Do.	50,000	3 25	150	148	
98	1859	Washington	N. C.	15,000	100	—	April & October.	1,500	6 00	....	...	
99	1848	Washington	Pa.	20,000	25	4	January & July.	4,000	3 00	....	....	
400	1854	Waterbury	Ct.	100,000	25	—	Do.	4,000	4 00	....	....	
1	1852	Waterford	N. Y.	12,000	25	—	Do.	4,000	4 00	....	....	
2	1852	Watertown	N. Y.	20,000	100	—	Do.	10,000	7 00	....	....	
3	1856	Watertown	Wis.	25,000	100	—	Do.	5,000	5 00	....	....	
4	1858	Wautoma	Wis.	30,000	50	—	Do.	3,000	4 50	....	....	
5	1857	Waverly	Miss.	20,000	100	—	April & October.	4,000	5 00	....	....	
6	1854	West Cambridge	Mass.	60,000	100	—	February & August.	10 000	4 00	....	....	
7	1852	Westchester	Pa.	100,000	25	2½	Do.	3,500	3 50	....	....	
8		Westfield	Mass.	25,000	100	6	Do.	4,000	4 00	....	....	
9		Weston	O.	20,000	25	—	Do.		5 00	....	....	
410	1857	West Point	N. Y.	50,000	—	—	United States Military	Academy.	2 00	....	....	
11	1853	West Troy	N. Y.	100,000	50	3	January & July.	10,000	3 60	85	....	
12	1850	Wheeling	Va.	75,000	25	6	Do.	12,000	2 70	....	....	
13		White Plains	N. Y.	20,000	20	—	Do.			....	....	
14	1856	Wilkesbarre	Pa.	50,000	50	—	May & November.	4,000	3 80	....	....	
15	1850	Williamsburg	N. Y.	1,000,000	50	5	January & July.	60,000	3 00	....	....	
16	1858	Williamsburg	Va.	30,000	25	—	Do.	3,000	4 00	....	....	Camp-fires of the Union Army light up this place at present.
17	1857	Williamsport	Pa.	70,000	25	4	Do.	3,500	3 80	....	....	
18	1859	Willimantic	Ct.	12,000	—	—	Do.	2,500	3 50	....	....	
19	1853	Wilmington	N. C.	60,000	50	5	Do.	8,000	5 00	....	....	
420	1852	Wilmington	Del.	200,000	50	5	February & August.	20,000	3 00	....	....	
21	1854	Winchester	Va.	36,000	50	6	January & July.	5,000	4 00	....	....	
22		Woburn	Mass.	20,000	—	—	Do.	3,000	4 00	....	....	
23	1856	Woodstock	Vt.	10,000	50	4	Do.	4,000	6 00	....	....	
24	1853	Woonsocket	R. I.	32,600	100	4	April & October.	4,000	3 50	....	....	
25	1856	Wooster	O.	25,000	50	—	January & July.	6,000	3 00	....	....	
26	1849	Worcester	Mass.	160,000	100	5	Do.	15,000	3 50	....	....	
27	1855	Xenia	O.	40,000	50	—	Do.	3,000	4 00	....	....	
28	1854	Yonkers	N. Y.	75,000	50	3½	Do.	6,500	4 00	102½	....	
29	1849	York	Pa.	40,000	57	3	June & December.	10,000	3 50	....	....	
430		Yorkville	S. C.	20,000	25	—	Do.	4,000	4 00	....	....	
31	1858	Ypsilanti	Mich.	20,000	50	5	February & August.	6,000	4 00	....	....	
32	1850	Yreka	Cal.	30,000	100	—	Do.	2,000	10 00	....	....	
33	1843	Zanesville	O.	44,600	25	4	Do.	10,000	3 50	....	....	

GAS-LIGHT COMPANIES IN THE BRITISH PROVINCES OF NORTH AMERICA.

No.	Chartered.	Town.	Province	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1	1854	Belleville	C. W.	38,040	100	4	January & July.	1,200	5 00	....	....	
2	1854	Brantford	C. W.	32,000	100	2½	Do.			....	....	
3		Brockville	C. W.	50,000	—	—	Do.	5,000	4 00	....	....	
4		Chatham	N. B.	50,000	—	—				....	....	
5	1854	Charlotte Town	P. E. I.	50,000	100	5	Do.	6,000	3 50	....	....	
5	1857	Cobourg	C. W.	30,000	—	—	February & August.	4,000		....	....	
7		Dundas	C. W.	30,000	—	—	Do.	6,000	4 00	....	....	
8		Frederick	N. B.	50,000	—	—	Do.			....	....	
9	1848	Halifax	N. S.	160,000	40	7	May.	30,000	3 00	....	....	
10	1850	Hamilton	C. W.	125,000	40	5	March & September.	20,000	3 50	....	....	
11	1848	Kingston	C. W.	80,000	100	—	Do.	6,000	3 50	....	....	
12	1853	London	C. W.	100,000	20	5	May & November.	5,000	5 00	....	....	
13	1847	Montreal	C. E.	460,000	40	—	March & September.	110,000	2 80	....	113	Last sale at this figure.
14	1854	Ottawa	C. W.	40,000	40	5	Do.	5,000	4 50	....	....	
15	1859	Point Levi	C. E.	25,000	25	—	January & July.	4,000	3 50	....	....	
16	1859	Port Hope	C. W.	28,000	20	4	May & November.	4,500	3 50	....	....	
17	1847	Quebec	C. E.	200,000	200	4	January & July.	61,000	3 00	....	....	
18	1848	Saint Catherine's	C. W.	80,000	20	—	May & November.	7,000	4 50	....	....	
19	1859	Saint Hyacinthe	C. E.	15,000	20	—	Do.	4,000	4 00	....	....	
20		Saint John	N. B.	170,000	85	—	June & December.	25,000	3 50	110	110	Sales at this figure.
21		Saint John's	N. F.	50,000	—	4	Do.	30,000		....	....	
22	1858	Sorel	C. E.	14,000	20	4	Do.	4,000	3 00	....	....	
23	1848	Toronto	C. W.	400,000	100	4	February & August.	50,000	3 33¼	....	....	

GAS-LIGHT COMPANIES IN CUBA, MEXICO, SOUTH AMERICA AND NEW ZEALAND.

No.	Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1		Callao	Chile.		—	—	January & July.	20,000	7 00	....	....	
2		Cardenas	Cuba.	50,000	—	—	Do.	180,000	5 00	....	....	
3	1857	Compania Cubana	Hav'a	500,000	500	10	Do.			....	....	
4		Cienfuegos	Cuba.		—	—	Do.	12,000	5 00	....	....	These four towns are lighted by the Compania Cubana of Havana.
5		Guanabacoa	Cuba.		—	—	Do.	14,000	5 50	....	....	
6		Regla	Cuba.		—	—	Do.	10,000	5 00	....	....	
7		Trinidad	Cuba.		—	—	Do.	16,000	5 00	....	....	
8		Guyaquil	S. A.	150,000	—	—	Do.	35,000		....	....	
9		Havana	Cuba.	1,250,000	500	7½	Do.	300,000	5 00	....	....	
10		Lima	Peru.	100,000	—	—	Do.	150,000		....	....	
11		Maranham (Chartered)			—	—	Do.			....	....	
12		Matanzas	Cuba.	50,000	—	—	Do.	180,000	8 50	....	....	
13		Mexico City	Mex.	550,000	—	—	Do.			....	....	
14		Montevideo	S. A.	500,000	—	—	Do.			....	....	
15		Para (Chartered)			—	—	Do.			....	....	
16	1854	Rio de Janeiro	S. A.	1,200,000	500	7½	Do.	300,000	4 00	....	....	
17		San Iago	Chile.	500,000	—	—	Do.	180,000	7 00	....	....	
18	1857	Saint Jago de Cuba	Cuba.	450,000	500	—	Do.	25,000	5 00	....	....	
19		Valparaiso	Chile.	500,000	—	—	Do.	85,000	6 00	....	....	
20		Vera Cruz	Mex.	500,000	—	—	Do.			....	....	
21		Ville Clara	Cuba.	50,000	—	—	Do.			....	....	
22		Auckland	N. Z.		—	—				....	....	

ON THE UTILIZATION OF PEAT, WITH REFERENCE MORE PARTICULARLY TO THE MANUFACTURE OF HYDRO-CARBON OILS.

By B. H. Paul, Ph. D.

(*From the London Artizan.*)

[Concluded from page 349.]

In order to get a satisfactory result in working the kilns, it was necessary to work up at least seventy tons of peat a week, and to obtain fully 5 per cent. of tar. Assuming that by the application of a fan this result was obtained, then the quantity of uncondensible gas passing away from the kilns might be taken as consisting essentially of the carbonic oxide produced by the combustion of the coke or charcoal yielded by that quantity of peat, plus the oxygen of the air required for its combustion. Taking the peat to yield 25 per cent. of charcoal, and the quantity worked as ten tons daily, there would be some 4 lbs. of carbon to be converted into carbonic oxide per minute in the kilns. This quantity would require rather more than 300 cubic feet of air, which, by conversion into carbonic oxide, would become about 360 cubic feet, and, at the temperature it entered the fan, might amount to 500 cubic feet. This, then, fixed the minimum capability of the fan to passing 500 cubic feet of gas per minute, even if the quantity of peat worked did not exceed seventy tons a week. But this rate of working was considered too small, and the peat, as it passed from the top of the kiln to the fire-grate, was very much greater than was requisite for distilling off the tar from the subsequent charge of peat, and consequently there was considerable waste of time, besides other obvious disadvantages, involved in the combustion of this surplus fuel. To remove this obstacle to the increase of the quantity of peat worked in the kilns, an arched opening was made in each kiln, just above the fire-grate, and fitted with a door, through which the charred peat could be drawn out at intervals, in such quantity as to leave only just enough to serve as fuel for distilling the peat. This plan could not be regularly carried out during the last winter, on account of the danger of opening the doors of the kilns during high winds while the front of the kilns was unprotected by sheds. It was nevertheless found that by drawing out the surplus charcoal the quantity of peat worked was very much increased, and a very much more considerable advantage would have been gained in this respect if the removal of the charcoal could have been effected independently of the weather.

In illustration of the effect of these improved arrangements, it may be mentioned that the quantity of peat worked was considerably greater than when working with the chimney draught, being in all cases upwards of 70 tons a week, and while the weather was favorable for drawing the surplus charcoal, upwards of 100 tons a week. The yield of tar was also increased to the extent of 7.5 per cent. of the peat worked, and was on the average as much as 7 per cent. The number of men required for working the kilns was also much smaller than was the case while working with the chimney draught. These results were in every respect very much more favorable than what had been anticipated at the outset, inasmuch as the cost of the tar, instead of being £5 per ton, was under £3 per ton, while on the other hand the quantity made per week, instead of being only six tons, was upwards of seven tons, and was also in a fair way of being increased.

One of the products obtained from the peat tar was a burning oil of excellent quality, similar to paraffin oil and the oil obtained from American petroleum. It was sold last winter in Glasgow, under the name of lignole, and was examined by Dr. Anderson, who expressed his opinion that it would compare favorably with the best varieties of mineral oils obtained from coal. The production of this oil is an important feature of novelty in the working of peat.

The heavier oil obtained from the tar would burn very well, but it requires a different form of lamp from that generally employed now for the hydro-carbon or so-called paraffin oils. When mixed with fat oils it forms a good lubricator. Some samples of this oil, mixed in proportions suitable for the spindles of cotton machinery, were examined by Dr. Rankine, of Glasgow, who reported on them as follows. The standard of comparison was sperm oil.

"The following table shows the results, the oils being arranged in the order of their friction-reducing powers, as shown by the number of revolutions made by the spindle:

	Relative lubricating power.	Number of Revolutions.
Oil No. 5.....	101	416
Sperm oil.....	100	411⅝
Oil No. 3.....	98	404
Oil No. 2.....	97	401⅜
Oil No. 1.....	85	349⅛

"The conclusions are that the oil No. 5 is somewhat superior to sperm oil as a lubricant, and Nos. 3, 2, and 1, somewhat inferior; but in the case of Nos. 3 and 2 the inferiority is only slight."

"I have not yet had an opportunity of testing by direct experiment the lubricating effects of these oils, or of compounds containing them, on the bearings of large and heavy machinery. The principal difference required in unguents for different kinds of machinery, depends on the intensity of the pressure at the bearings; the more intense pressures requiring thicker or more viscid unguents, that they may resist the tendency of the pressure to force them out. Additional thickness is given to an unguent, when required, by dissolving a sufficient quantity of solid greasy matter in the oil; and from previous observation of the properties of unguents containing oils analagous in their chemical character to those with which I have been furnished from the Lews Chemical Works, I am satisfied that the latter oils may easily be thickened in the same manner, so as to adapt them to any intensity of pressure at the bearings to which they may be applied."

The apparatus by means of which these oils were tested, as regards their application to cotton machinery, consisted of a cotton spindle, supported in a vertical position upon a pivot lubricated with the oil to be tested, and carrying a fly or revolving disc. This spindle is set in motion by a constant weight, descending through a constant height, and allowed to revolve freely until it stops of itself, the whole number of revolutions made before stopping being counted by the aid of suitable mechanism. The greater that number of revolutions, the more perfect is the lubrication produced by the oil; and, inasmuch as the bearing at which the friction is tested, is that of an actual cotton spindle, the results of the experiments give a peculiarly satisfactory test of the qualities of the oils for lubricating these bearings, and bearings of light machinery in general.

Having already referred to the Irish Peat Company's works, and to the results obtained there, I would now wish briefly to point what appears to have been the circumstances which contributed to the signal failure of that undertaking. Table I. contains a comparative statement of the results anticipated from the working of Irish peat, and of the results actually obtained.

Together with these results are given, also, comparatively, the results obtained at the Lews works by myself.

The prices set down for peat, and for the products obtained from it, are the same in different cases, except in the statement of the working results of the Irish works in 1855. In that case the cost of the peat is set down as 4*s.* per ton, as reported in one of the official documents of the Company to have been the cost. The

TABLE I.

	1		2		3		4		5		6		7	
	Anticipated results from the working of Irish Peat, as set forth in the Company's prospectus, on the authority of Mr. Reece, 1851.	Value.	Sir Robert Kane's Report, 1851.	Value.	Working results with Irish Peat, as given in Mr. Sullivan's Report to the Directors of the Irish Peat Company, 1855.	Value.	Retort Tar from Lews Peat, 1858.	Value.	Kiln Tar from Lews Peat, 1863.	Value.	Working Trial of 1 ton Kiln Tar from Lews Peet, 1858.	Value.	Working Result from Lews Peat since the Fan was used, 1861–62.	Value.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.
Quantity of peat worked.....	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	20 0 3	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	10 0 0	100 tons.	10 0 0
Sulphate of ammonia.....	20 cwt.	12 0 0	20 cwt.	12 0 0	3 cwt.	1 16 0								
Acetate of lime.....	14 cwt.	9 16 0	4 cwt.	2 16 0										
Wood naphtha, 5*s.* per gal.....	52 gals.	13 0 0	52 gals.	13 0 0	10 gals.	2 10 0								
Crude oil, 1*s.* "	300 gals.	15 0 0	300 gals.	15 0 0										
Paraffin, 1*s.* per lb.....	300 lbs.	15 0 0	300 lbs.	15 0 0	300 lbs. 150 gals.	15 0 0 15 0 0	999 gals. 330 gals.	99 18 0	585 gals. 560 gals.	53 10 0	500 gals.	50 0 0	749 gals.	74 18 0
Refined oil, 2*s.* per gal.....														
Cresote.....														
Total value of products.....		64 16 0		57 16 0		34 6 0		99 18 0		53 10 0		50 0 0		74 18 0
Cost of material and manufacture.....		32 2 0		32 2 0		34 3 4		Cost of working not ascertained.		37 10 0		37 10 0		38 14 6
Balance.....		32 14 0		25 14 0		0 2 8				16 0 0		12 10 0		36 3 6
Value of oils and paraffin.....		30 0 0		30 0 0		30 0 0				53 10 0		50 0 0		74 18 0
Cost of material and manufacture.....		32 2 0		32 2 0		34 3 4				37 10 0		37 10 0		38 14 6
Balance.....		2 2 0		2 2 0		4 3 4				16 0 0		12 10 0		36 3 6

value assigned to the oil, in this case also, is not 5*s.* per gallon, as given in the Company's report, but 2*s.* per gallon, which I believe to be nearer its true value, and which admits of the results being compared with the other cases, in which that is the value set upon the oil.

The difference between the anticipated and the actual value of the ammoniacal salts, acetate, and naphtha, produced from the peat, is strikingly great, and I think it affords sufficient confirmation of the opinion I have already expressed as to the impropriety of regarding these products as constituting any source of profit in working peat, except when the manufacture of the other product is in itself remunerative.

But if these products are disregarded, the amount of oils and paraffin yielded by the Irish peat is so small, as compared with the cost of production, as to leave no possibility of profit. In addition to this it may be mentioned that the quality of the oil produced at the Irish works was very inferior, and bore no comparison to that of the oil produced at the Lews works. The manufacture of burning oil, indeed, was not attempted at the Irish works, in consequence of the offensive smell which the lighter portion of the oil possessed.

On the other hand, the yield of oils and paraffin from Lews peat is from three to four times as great as that obtained from the Irish peat, while the cost of working is but very slightly greater. The cost of peat in the two cases is also very different; for while in Lews the peat never cost more than 2*s.* 6*d.* per ton, and has since been obtained at a much lower rate, the cost of peat at the Irish works was 4*s.*, and even as much as 6*s.* and 7*s.* per ton—a circumstance which, in itself, would be inconsistent with the possibility of working even such peat as that of Lews.

With these facts so clearly apparent, it is not a matter for surprise that the results obtained at the Irish works were not sufficient to afford a return for the enormous expenditure of capital on the works that were established; and to those who take an interest in the subject of peat working, it must be a source of regret that the attempt to work the Irish peat was made and followed up with such rash precipitation, and with so little preliminary examination of the capabilities of the material for working which such a large investment was made. Under any circumstances, the working of peat is surrounded by many serious difficulties as regards both its establishment and prosecution. The districts where peat occurs are generally wild and remote, destitute of all those appliances and facilities for industrial operations which are to be met with in more cultivated parts of the country; the climate inhospitable and unfavorable for out-door work, and the inhabitants —accustomed to a rude mode of life, disliking work, and strenuously opposed to anything differing from their customary habits—are not easily trained to systematic labor. But these are not impassable barriers; they are merely obstacles which are to be overcome by patient perseverance, and, from the practical experience I have had of this subject during the last four years, I feel convinced that such peat as that occurring in the Western Islands and in the Highlands of Scotland, may be worked advantageously; and that, if the manufacture of these oils, which have now become such an important article of commerce, be carried out with earnestness and perseverence, it will become a means of greatly improving the condition of those districts in every respect, and a fertile source of profit to those who carry it out.

Burning and Exploding of Gases.—Sir H. Davy, in his important and interesting experiments, found that light carburetted hydrogen, the most powerfully explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from eight to nine times its bulk of air will produce the most explosive mixture of coal-gas; but the air and gas must be mixed previously to inflammation. No matter how rapidly the air may be supplied when the gas is burning, it will merely increase the fierceness of the combustion; there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from about 7 to 25 per cent of volume; if it fall short of, or exceed, that proportion, it will burn away quietly and not explode.—*Scientific American.*

PETROLEUM ITEMS.

Future Supply of Petroleum.—The Oil Springs *Chronicle* asks the question—"Is the supply of petroleum inexhaustible?"—and thus proceeds to answer the interrogation:

To men of limited means, whose bump of cautiousness is somewhat predominant, two insuperable barriers to their success in petroleum mining loom up before them. The first is the chances of failure in striking a paying vein, and the second the all-important one which at present is the absorbing topic of conversation and debate, namely, the uncertainty of the continuous supply of oil. As to the first question, that of the probability of failing to obtain oil in paying quantities, it should not be—and indeed is not to a man of energy and enterprise—any obstacle to the good fortune of any one, as experience has shown that there are a hundred chances for to one against success in getting oil. Still there are many persons who (not only in respect to the oil business, but with regard to every branch of industry under the sun), unless they see the road to fortune strewn with roses, are not willing to embark in any enterprise. Such individuals seldom or ever experience the pleasures which wealth is calculated to afford. The second question, as to the uncertainty of the supply of oil continuing, is a more difficult one to answer, and is certainly a formidable obstacle in the way of the development of the treasures of Enniskillen. The *Journal of the Board of Arts, &c.*, for Upper Canada, speaking on this subject, says:

"The yield of the wells will probably be also intermittent, and springs which promise favorably for a time will soon be exhausted, and require a greater or less period for their restoration. * * But while we would strongly caution "prospectors" against deep boring, yet there is no reason why numerous shallow wells should not yield a considerable supply for some years to come—quite sufficient to make a limited outlay of capital, cautiously expended, give remunerative results."

This opinion seems to be borne out by the fact that many wells which had turned to water and were given up as a failure, have been found, by keeping the water under by constant pumping, to yield oil in paying quantities, and a number of them are now yielding from 20 to 40 barrels a day. It should also be remembered that a tithe of the oil territory has not yet been entered upon, and while in Pennsylvania almost every foot of ground for the distance of eight or ten miles in one direction, which gave any indication of the existence of petroleum, has been perforated, hundreds of acres of what we have reason to believe to be the best oil territory here, have not yet been touched by the drill. This land bears unmistakeable signs on the surface of being rich in mineral oil, and is commonly known as the "gum beds," the oil having forced its way to the surface of the ground, where it is deposited in the shape of asphaltum. The *Journal*, quoted from above, also speaking of the gum-beds, says:

"The deposits of asphaltum or bitumen, in the township of Enniskillen, are perhaps the existing records of petroleum springs which have been oozing for ages, and the material, by long exposure to the atmosphere, has absorbed oxygen and become converted into the viscid or semi-solid mass which now occupy several shallow depressions in that township, and also in Zone. Wherever these deposits are found, it appears reasonable to suppose that boring would reveal a petroleum spring, and in such localities a search for the fluid would be most successful and the supply most abundant."

Our readers will draw their own conclusions from the above facts. For our own part, we think there is sufficient evidence to show that if the supply of oil is not inexhaustible, there is enough, at least, to supply all demands for many years to come.

An Immense Oil Well.—The Harrisburgh *Union* states that one of the most valuable veins of petroleum was lately struck on the Farrell farm, Oil creek, Venango county, Pa. The well commenced flowing on Saturday, June 6th, the oil spouting up to a height of fifty feet, with a roar like a hurricane, and escaping at the rate of two thousand barrels a day. A stop-cock was got on after much trouble, and the flow can now be regulated to suit the demand. Another flowing well in the vicinity, was so affected by the opening of the new well, that its yield decreased over three hundred barrels per day. The Farrell well, which is about four hundred and fifty feet deep, was at last accounts flowing steadily at the rate of twelve hundred barrels per day. This, even at the moderate prices now ruling at the wells, would yield the owners $3,600 a day.

The Pennsylvania Oil Region.—A late number of the Oil City *Register*, says:—"The market has been firm since our last report, and transactions fair. The general range of prices for the week have been from $3 to $3 50 at the wells, and from $4 to $4 25 here. Many producers are asking $3 75 and even $4 at the wells. But we know of no sales at these figures. We hear of one sale of 1,000 barrels, made Friday, at $4 40, delivered here. No stock, save the daily production, on hand. The Phillips, Woodford, Graff, and Hasson wells, have stopped flowing. Judging from the amount these wells are claimed to flow, this would make a reduction in the daily supply of about 1,500 barrels. We hear of several new wells being struck, but none of much consequence. This season has been a prosperous one for the oil producers, and prices rule higher than at any previous spring and summer season. Parties here think the present prices will advance still further, in consequence of the demand being in excess of the supply. Whether this be correct or not, we can scarcely say. We don't think the daily production of Oil Creek will exceed 4,500 barrels; some estimate it at about 5,000. From this amount should be deducted 20 per cent. of wastage. So refiners and dealers can draw their own conclusions. The river is low. Freights to Pittsburg, 75 cents. Price of barrels, $2 50 to $2 75. Weather cloudy, with occasional showers. Market closes firm and buoyant."

The editor of the *Register* has been making a visit to Pittsburg, Pa., and from that place he writes the following interesting particulars:

"Next to the manufacturing and coal business of Pittsburg, is the oil trade. Three years since but a few barrels or kegs of petroleum found its way to that city. Since that time it has been estimated that over 2,000,000 of barrels of this greasy treasure has been landed upon their wharves. Innumerable refineries, some with a capacity of 2,000 barrels per week, and one, we understand the Standard, has capacity of 600 barrels per day, has sprung up, as if by magic, all around the city, for the manufacture of illuminating oil, and the different derivatives obtained from petroleum. Neither money nor labor has been spared to make these establishments the most perfect and extensive in the country. As an evidence of the magnitude of the oil trade of Pittsburg, we are informed that the shipments of oil over the Pennsylvania Railroad, from the 1st of January, 1863, to the first of the present month, foot up about 255,000 barrels. The shipments for the month of April of present year, amounted to nearly 90,000 barrels. As we have not space to go into details, the reader can form some idea of the benefits derived by the people of Pittsburg from this article of traffic. Its transmission from this point employs a fleet (usually) of sixteen steamboats (tug and passenger), and there is room for several more, and, also, from three to four hundred flat boats and barges, and not less than 1,500 or 2,000 boatmen.

"The sixty refineries in and about that city, give employment to a great number of laborers and mechanics of all kinds, and consume a vast amount of coal. And probably no other business, considering the short time that it has existed, affords a more princely revenue to our Government in this, the hour of her sorest need."

Dangerous Character of Bulk Petroleum.—The *Oil City Register*, in alluding to the recent fire, states that petroleum, in bulk, is very dangerous after being recently agitated. Any movement of a large quantity brings up the benzole, which is the lightest quality of it, to the top and into the atmosphere. This is an inflammable gas. The slightest contact with a flame sets it off in a flash. Bulk oil impregnates the atmosphere, and on the contact of a flame of any kind it ignites and explodes.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

LIGHT, HEAT, WATER-SUPPLY AND SEWERAGE.

Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, HEATING, and DRAINAGE everywhere.

THERE ARE 20,000 CITIES AND TOWNS IN THE UNITED STATES, CAPABLE OF SUPPORTING GAS-WORKS, WHILE THERE ARE NOT 400 GAS-WORKS IN OPERATION IN THE WHOLE COUNTRY!!!

TERMS—CASH IN ADVANCE.

SUBSCRIPTION—In the U. S. and British Provinces, $3 per annum. In Great Britain, 12s. per annum, payable in British post-office orders, remitted to the Editor, as below.

ADVERTISEMENTS—According to position and space occupied.

☞ Remittances by mail to be addressed to the Editor,

C ELTON BUCK,

ROOMS of the AMERICAN GAS-LIGHT JOURNAL,

No. 39 Nassau st., cor. of Liberty st., opposite the Post-Office.

New York City.

AGENTS OF THE AMERICAN GAS-LIGHT JOURNAL

FOREIGN.

Germany .....B. WESTERMAN & Co., of New York.

Great Britain....TRUBNER & Co., 60 Paternoster Row, London, where single copies may always be found,

Paris, France. ..} LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonnière.

DOMESTIC.

V. HAROLD MYERS, No. 152 South Fourth st., Philadelphia.

The AMERICAN GAS-LIGHT JOURNAL can be purchased of all the newspaper and periodical dealers in the U. States and Canadas.

THE

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

MONDAY, JUNE 15, 1863.

A bill has been introduced into the British Parliament by Lord STANLEY, which is regarded by manufacturers generally with no little interest. It is entitled the Alkali Act, and though as its name indicates, it refers more particularly to the manufactures of alkali works and their residual products, yet other branches of technology, which may be construed into being nuisances to a neighborhood, may be remotely interested in the principles of the bill.

During the last twenty years the chemical manufactures of Great Britain have increased at a most unprecedented rate, and the figures showing the extent of this increase are wonderful. Owing to the rapid strides which the science of chemistry has made in that country, unfolding new and inexpensive modes of accomplishing what formerly was done at an immense outlay of both time and money; and explaining the *rationale* of other branches of chemical manufactures, thus making simple and plain many a fact, before mysterious,—the productive skill of the country has been stimulated to a greater exhibition of energy than ever before, and factories and laboratories have sprung up all over the island.

The benefits rendered by purely scientific research in chemistry, and technology, or that branch of it applied to manufactures, have been in many instances reciprocal. The students of abstract science, in their investigations into the laws of nature, have made many important discoveries—important alike to the cause of science and to themselves, as adding to their stores of knowledge, and also to the manufacturer, who, profiting by their suggestions, turns their skill to account in the improvements which everywhere follow fast in the footsteps of philosophy. On the other hand, we have seen the manufacturer, who by patiently and perseveringly studying out the cause of some mysterious phenomenon noticed in the course of his daily toil, make discoveries of the most important nature, which add to the lore of the savan and serve as important landmarks in the upward march of progress.

We have been astonished at the rapid progress made during the past decade, by English savans and English manufacturers. A few years ago, Germany and France were thought to be the only places in the world where thorough discipline in philosophical research could be found. In chemistry this was particularly the case. We do not by any means mean to intimate that these countries have experienced a decline in this respect; but we do unhesitatingly say that English chemists have advanced in a ratio more rapid, and English chemical manufacturers have risen to a position of eminence, equal, if not superior to those of any other country. Hence the great increase in the number of manufacturing laboratories, and the necessity of some legislation to guard against damage being done to agricultural districts, and to protect the health of the people from the effects of the noxious fumes and vapors which some factories so freely give off.

It is well known that in the manufacture of soda ash from common salt, the first step is to effect a combination between the soda of the salt and sulphuric acid, whereby sulphate of soda is formed, and the muriatic acid, which formerly existed in combination with the soda, is liberated in the form of a gas. This decomposition is effected in large furnaces or retorts, at a high temperature, and the muriatic acid which is eliminated, is condensed by being compelled to pass upwards through high chambers filled with coke, stones, or other material capable of diffusing it, through which streams of water are allowed to flow. The acid vapor coming in contact with the water, is absorbed by it, and flows out at the base in a greater or less stage of concentration. By a careless disregard of the details of the manufacture, and in some instances unavoidably, a portion of this muriatic acid-gas is allowed to escape into the air, where its presence is immediately made manifest by its peculiar odor, and the destructive effects it has upon vegetation.

The Alkali Act which has just been noticed, provides that an inspector shall carefully examine the progress of the manufacture, and that he shall see that not more than five per cent. of the muriatic acid eliminated shall be allowed to escape into the air. Each alkali work must be registered within three months after the appointment of an inspector for the district in which the work is situated, and minute directions are laid down as to the appointment of inspectors, and the duties required of them.

There are other branches of industry, in the prosecution of which noxious gases and vapors are evolved; and although these may not be as detrimental to a neighborhood as muriatic acid gas, still, from their offensiveness they are construed into nuisances, and are often deemed prejudicial to health, even where they are really innocent, except in so far as they offend the sense of smell.

By some individuals, gas-works in all crowded communities would be tabooed. It cannot be denied that many of these establishments emit anything but fragrant odors, and that their immediate vicinity is sometimes pervaded by a stench almost intolerable. But we never knew of any injury having been done, either to persons or things, by the proximity of gas works. This fact is not so easily appreciated by the people, however. Their judgment, founded only on the evidence of their senses of sight and smell, often goes astray in complaining of these factories, and in setting them down as worthy of the attention of health officers. The experience of those familiar with the manufacture, is almost unanimous to the effect that gas-works do not generate vapors or gases which are prejudicial to health. All writers on this subject confirm this assertion; and the general health of the stokers and other laborers engaged in the production of gas, is additional evidence to prove the same point. In this respect gas-works are superior to chemical laboratories. The workmen in the latter are frequently obliged to change their vocation, and to adopt other pursuits, in order to regain their lost health. But because gas-works emit a disagreeable odor, they are denominated dangerous by the unthinking people, and classed in the same category with nuisances generally. This should not be the case. The greater part of the odors pervading their vicinity may be avoided, and it should be the endeavor of every engineer to place his establishment above suspicion. To do this might require some outlay and great care, but it would be well worth the trouble, and the end sought after could be easily accomplished.

FUNNY—ISN'T IT?

Although *Pater familias* is not often detected in an amiable frame of mind, yet he occasionally likes to get off his little jokes, some of which are as much out of place as a broad grin at a funeral. Other subjects being scarce, the old gentleman has recently been playing the following tune on his "organ," which we give as we find it in his *Journal of Gas-Lighting*, except that we have italicised the part where the laugh comes in.

"The good fortune of this country seems unbounded. The last instance has occurred in Charleston Harbor, where the fleet of *Monitors*, whose rapid construction inflamed American conceit to the highest pitch, was reduced to ruin, or compelled to flight within half an hour. *As we are essentially a non-aggressive nation*, every triumph of defence is a pledge of safety for us. Had Charleston been taken, there is no knowing where Federal arrogance might have next led the fleet of *Monitors*—probably, to attempt to execute on some one of our ports what their newspapers have long been threatening. After this crushing defeat, only one jubilant voice is to be heard in the Federal camp—that of the inventor, ERICSSON, a man of boundless ingenuity, yet doomed to perpetual failure wherever he attempts a great work—as witness the first locomotive on the Liverpool and Manchester line; the atmospheric-engine-driven American Frigate; and last, these over-vaunted iron-clads."

How witty! SIDNEY SMITH was nothing compared with our urbane contemporary. But then the reverend joker had one advantage over *Pater familias*. He was truthful in his sayings, and drew no false inferences, nor made deceptive assertions. "*As we are essentially a non-aggressive nation*," is really too cruel a jest, to be perpetrated with impunity. What definition does *Pater familias*' dictionary assign to the word "non-aggressive"? Does it mean bullying the weak, snubbing the powerless, tyrannizing over friend and foe alie? If "we" are so "non-aggressive," then indeed have the histories of HUME, and MACAULEY, ALLISON and MAHON, with scores of others, been written in vain; and their testimony is expunged by our sapient contemporary with one stroke of his pen. What would India and China have to say to this remark? For what were CLIVE and HASTINGS commissioned and rewarded? To carry out the "non-aggressive" policy, we suppose. But we must not mistake the irony of *Pater familias* for sober truth. Let us appreciate it, and laugh heartily over it, since this is clearly the place where the laugh comes in. We must confess it to be very funny, even if we have to strain a point in so doing—very much as children make a wry face over a nauseous dose of medicine, and yet declare it to be good. Pray, Governor, be careful of your jokes in future, for our aching sides will not bear such strong exercise as your wit provokes.

GAS FROM ANTHRACITE COAL.—At a recent meeting of the Board of Councilmen, of this city, the following resolution was offered by the President:

Resolved, That there be and is hereby granted to the Anthracite Gas-Lighting and Heating Company, of New York, permission to lay pipes and mains for conducting gas, for illuminating and heating, and for other purposes, through the streets, avenues, lanes and other public places in the city of New York, for a period of fifty years, as provided by the general manufacturing laws of the State of New York—the same conductors to be laid under the supervision of the Street Commissioner, the said company being required to restore the streets opened by them for laying such pipes to the same condition as before the said pipes or mains were laid.

Which was referred to the Committee on Finance.

This is something new in the history of gas-lighting. We have now in operation in New York city, three gas companies belonging to the regular persuasion, one "hydrogenated fuel company," chartered, but works not yet built, and now another corporation for making illuminating and heating gas from anthracite coal, is about obtaining permission to lay pipes and mains through the streets. Rumor says that the new applicant for public favor has some strong names to back it, but we have not been, as yet, advised of any particulars concerning it.

FINANCIAL.

Saturday Evening, June 13th.

The downward tendency of the general share list during the past fortnight, though not causing so great a depreciation in the prices paid for gas-light shares as might have been predicted by those not familiar with such securities, has nevertheless caused less inquiry to be made for them. Sales have been few, but prices have been, with one or two exceptions, well maintained.

Not a few capitalists who put their funds in shares of any kind, whether for speculative purposes or for permanent investments, have very peculiar opinions in regard to their favorite kind of securities. Their ideas are limited to the comprehension of but two or three things at a time. Some, for instance, have faith in railroad shares, and in these only, others prefer bank stocks alone, while some are as exclusive in their devotion to gas shares, and so on to the end of the list. The latter class we have named, in our humble judgment have decidedly the best foresight of the three. The capitalist who invests in gas shares is more sure of a speedy and profitable return than the holders of most other securities can count on. Very few, comparatively, understand this; hence the small number of holders of gas-light shares. In England these securities are a very favorite investment for monied men, and this preference leads the capitalists of that country to invest not only in the shares of local companies, but to put their money in distant companies in the far-off colonies.

In this country a decided advance is being made in this matter; and new parties are freely entering the market as purchasers. The abundance of money and the prosperity attending almost every branch of business, has, doubtless, much to do with this, but quite as much is due to the increasing opinion that gas-light shares are the soundest and best securities the market affords.

We notice still parcels of stock in the market, of which we made mention in our last issue. *Citizens'* of Brooklyn, N. Y., and *Metropolitan*, of this city, are favorite companies with purchasers just now, as are also the old *Brooklyn*, and the *New York* and *Manhattan* companies. These last three, of course, take the precedence; but whether these shares at the enormous prices demanded for them—particularly the two last named—are worth the money, induces certain eminent economists to shake their heads, and to look out for something else.

Buyers for a rise prefer *Citizens'* and *Metropolitan* to either of the others.

At a public sale at the Merchants' Exchange on 4th inst., parcels of *Beverly*, Mass., *Greenfield*, Mass., *Greensburgh*, N. Y., *Milford*, Mass., and *Westfield*, Mass., gas shares were offered. These companies being but little known in this city, or indeed any where out of their own immediate neighborhood, no bids could be obtained, and they were consequently with drawn.

ANSWERS TO CORRESPONDENTS.

J. B. S., of N. J.—*We have seen the report you allude to, but think the inferences totally wrong. Indeed they are very far wide of the truth, and we are surprised at such conclusions from a source from which better things might have been expected.*

A. O. E., of Me.—*The* JOURNAL *does not deal in gas-light shares, or apparatus of any kind. For the former we refer you to our columns, under the head "Financial." For the latter you will see many advertisements in their proper part of the paper.*

J. L., of Pa.—*We have not as yet heard of the results, but will notify you when we are informed. It is very doubtful whether the idea is sufficiently novel to be entitled to a patent.*

E. E. A., of Cal.—*We are pleased to hear of your prospects. The gas companies of California, despite their enormous charges, seem to be in a prosperous condition. We thank you for your kind attention. Such favors are always pleasant to receive.*

R. C. B., of Mo.—*We shall be glad to receive the promised sketch, which we will dispose of as you suggest. We would recommend Hughes' work, as it is about the best rudimentary book on the subject. A new work on gas is sadly needed.*

P. K. G., of Ky.—*Yes: if proceeded with at once. The party's address is Boston. We presume he is there still.*

F. C. H., of N. Y.—*The papers you speak of will be continued in our next volume.*

U. H., of Del.—*You need have no apprehensions on the score of danger. The apparatus we believe to be perfectly safe, and we cannot see how an explosion can occur, unless induced intentionally, or, by what is nearly as reprehensible, gross carelessness; and even then it would be difficult to cause much damage.*

J. T. S., of N. Y.—*We thank you for the information sent us, which you will perceive we have used. If you notice mistakes respecting other companies, we shall be obliged if you will mention them.*

CORRESPONDENCE.

PETROLEUM AND COAL-GAS.

New York, June 6, 1863.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

In your last issue, I noticed that you devoted your leading article to making some remarks on the subject of petroleum gas,—your attention being no doubt called to the subject by the ridiculous assertions of the Canadian newspaper from which you quoted a few lines.

When false statements of an ordinary character are suffered to be published to the world, and "no-questions asked," it is all very well; but when assertions are thoughtlessly made, and predictions which can never be verified stated on subjects of a scientific or technical nature, it is well to occasionally refute such falsehoods, even though they be not entitled to respect, by reason of the insignificancy of the source whence they emanate. The assertion by the Canadian editor, that "it is now proved beyond a doubt that gas manufactured from petroleum, must eventually supersede coal-gas everywhere, and that it can be successfully worked on a large as well as on a small scale," is too idle to receive a moment's attention, and yet, as you have printed it, and in your columns it will be read by all the gas engineers in the country, it may be well to examine the proposition with some little attention, even though the game be not worth the powder.

In my former letters on the subject of the comparative cheapness of petroleum and coal-gas, I stated that when petroleum gas is well purified and thoroughly condensed and washed—or, in other words, when it is distributed to consumers in the only state in which it is fit to be burned—but 60 feet of gas can be made from one gallon of the crude oil. Although I have seen other statements, by which it would appear that 100 feet, and even more are claimed to have been obtained from one gallon of petroleum, I see no reason why my former statements may not be implicitly relied upon.

Now upon this basis, let us see what would be the increased demand for petroleum if only one of the gas companies of this city were to substitute this substance for coal as a raw material.

The Manhattan Gas Company, of this city, make, in round numbers, one thousand million cubic feet of gas per annum. To produce this enormous quantity of gas, over one hundred thousand tons of coal are required. In order to generate this amount of gas from petroleum, sixteen million, six hundred and sixty-six thousand, six hundred and sixty-six gallons, or four hundred and sixteen thousand, six hundred and sixty-six barrels (allowing 40 gallons to the barrel) would be required. Of this immense amount, at least ten per cent. must be added for leakage, and this is a *very* moderate allowance. With this addition, the total amount would foot up to eighteen million, three hundred and thirty-three thousand, three hundred and thirty-two (18,333,332) gallons, or four hundred and fifty-eight thousand, three hundred and thirty-three (458,333) barrels. This, be it remembered, is the *annual supply* which would be required by this *one* gas company, were they to allow petroleum to "supersede" coal in their works. Can any sane person fail to see what an effect this sudden and enormous demand would have upon the market for oil? Prices would immediately advance to an unheard of figure, and the revolutions which would be caused in the trade, would be without a parallel in the history of commerce.

But, some advocate of petroleum-gas may remark, that as the illuminating power of this gas is so superior to that of coal-gas, a much less proportionate quantity of raw material would be required. It will be remembered that the editor of the *Journal of the Board of Arts for Upper Canada*, asserted that a sliding scale of luminosity could be adopted for petroleum-gas, but this was thought "not advisable to publish." This gentleman claimed petroleum-gas to be four times as rich as coal-gas, then "assumed" it to be three times as rich, while Dr. Gibbs proved it to be less than twice as rich. For the sake of argument, I will admit that petroleum-gas *is* twice as rich in illuminating power as coal-gas, although this is admitting far too much for the truth of the case. With this admission, then, the quantity of crude petroleum required to make gas equal in illuminating power to 1,000,000,000 cubic feet of coal-gas, would be diminished to just one-half of the above figures, or nine million one hundred and sixty-six thousand six hundred and sixty-six (9,166,666) gallons, equivalent to two hundred and forty-nine thousand one hundred and sixty-six (249,166) barrels of crude petroleum *per annum* for the Manhattan Gas Company alone!

The Canadian paper says that petroleum must supersede coal "*everywhere*," and that this is "now proved beyond a doubt." Suppose the New York Gas Company, and the Philadelphia and Baltimore companies also, were to use petroleum in place of coal. Let us see how the figures would then stand.

	Barrels.
The Manhattan would require about.....	249,166
New York Gas Co. " "	124,583
Philadelphia Gas Co. " "	166,110
Baltimore Gas Co. " "	124,583
	664,442

These four gas companies would yearly consume no less than six hundred and sixty-four thousand, four hundred and forty-four barrels, or twenty-six million, five hundred and seventy-seven thousand, one hundred and eighty gallons of crude petroleum *in addition to the present demand! If four gas companies, in adopting petroleum instead of coal-gas, create this excessive demand, what would be the aggregate increase if all the* 430 *gas-works in the United States were to employ the same substance?* This is not exactly a simple rule-of-three sum, for I have selected the four largest companies in the country for the sake of illustration. But it is sufficient to show the almost incalculable increase in the demand for the raw material which would ensue, and it clearly proves what a revolution in the market would be created, to the detriment of every department of the petroleum business. In fact it would not be possible to supply such a demand.

Petroleum-gas will *never* and *nowhere* successfully compete with coal-gas. This is a fixed fact, and it is not to be gainsaid. Knowing that the minds of many engineers throughout the country have been occupied with the subject, I have concluded once more to take up a portion of your space to protest against such asinine remarks as that quoted from the Dundas *Banner*. I am sensible that to ask for the use of your columns to controvert such silly predictions, is like using a fifteen-inch gun to kill a tom-tit. But if the powder be wasted, it is burnt in the cause of truth, and so it must be considered as well applied.

There are gas engineers in the Province of Canada, who are an honor to their profession. Many of these gentlemen I know by reputation; and with some of them I have the honor of personal acquaintance. Not a few of them have thoroughly examined the subject of the comparative merits of petroleum and coal-gas, and I am satisfied that their decision is that which must be reached by every honest inquirer. We hear none of them declaring in favor of petroleum-gas "everywhere." Their professional knowledge is sufficient to teach them the fallacy of such silly assertions as that made by the *Banner;* and as they have, many of them, been sufferers by the introduction of cheap coal oils, and the consequent diminution in their profits as gas manufacturers, and as they have studied the question of lessening the cost of the manufacture of gas, and have *not* adopted petroleum, they may be considered as still being on my side of the question.

AN ADVOCATE OF COAL-GAS.

WATER-WORKS OF AMERICA.

HARTFORD, CONN.

In our last issue we published an abstract of the last annual report of the Board of Water Commissioners of Hartford, Conn. It having been found advisable to enlarge the works, and to make arrangements for obtaining an increased supply, the services of Samuel McElroy, Esq., C. E., were engaged. This gentleman has made a report on the subject, from which we shall draw largely in presenting the suggestions therein embodied. Mr. McElroy commences his report by alluding to the present water supply of Hartford, and successively reverts to the proposed increase of supply, the improvement of distribution, increased storage, and the various plans which have been from time to time proposed.

PRESENT SUPPLY.

Hartford is now supplied by steam-power from the Connecticut river, the engine-house being located at a point on the shore line in the immediate vicinity of the business portion, and at the foot of the slope of one of the distinct and prominent elevations within the city limits.

The engine-house is a substantial, ornamental, and costly structure, connected with the river by a protected supply pipe and well, and elevated above the reach of nearly all extraordinary freshets. All its appointments are well devised, and it is sufficiently large to admit considerable increase of engine and boiler power.

The engine occupies a large boiler, engine, and pump-room, with its several parts. Its cylinder has five feet stroke, and 32⅜ inches bore. It has four pumps of 32½ inches joint stroke, by 18¾ and 19 5-16 inches bore; and one boiler 22 feet long by 7½ feet diameter. At its ordinary working speed, when tested for "duty" by the engineers of the Brooklyn Water-Works, in 1856, its delivery into the reservoir was 1,771,396 United States gallons per twenty-four hours. It is connected with a force-main sixteen inches in diameter, 6,879 feet long, entering the bottom of the reservoir. The boiler and cylinder are not worked up to their full power; the pumps are too low, too much divided, and may be largely increased in delivery; the force main is badly located, and too small in diameter, its friction, under test, being 12.59 feet above an actual lift of 109.35 for the delivery above named. The average running time for 1862 was 17.07 hours per day, the delivery being 1,346,971 gallons. The pumps need some repairs, which interfere with the constant duty required, and with but one engine and a small reservoir, the city may at any hour be exposed to great inconvenience and damage by accident.

The reservoir is a structure of earthwork on Lord's Hill, with a small and irregular figure, 1.31 acres in water surface, a depth of about thirty feet, containing 7,830,572 gallons. Its water slope is faced with a dry stone-wall, on angles varying from "one and a half" to "two to one." Its flow line is 125 feet above low water-mark, being sixty-six feet above Main street at the State House, forty feet above the summit of the college grounds, forty-three above Washington street at Buckingham, and thus covering the densely populated portion of the city. It is about thirty feet above the plateau between Washington street and the foot of Zion's Hill, and thirty-two feet below the summit of Vernon street on this eminence. Its distance from the line of supply south of Little River, its limited storage for a rapidly increasing demand, and its need of a division-wall for purposes of examination, cleaning, and repair, render a modification of reservoir arrangements, as to location, elevation, and storage, advisable at once.

The distribution, up to January 1st, 1862, was thus arranged:

Diameter (in.)	3	4	6	8	10	12	Force Main. 16	Total.
Length (feet)	2,369	32,470	80,958	16,777	4,451	9,526	6,879	153,570 or 29.08 miles.
Stop cocks		45	106	12	12		5	180
Hydrants								149

The effluent line from the reservoir is by a 12 and 8-inch pipe. Three lines of pipe—12, 8, and 6-inch—cross Little River. The length of pipes above 8-inch is limited, and the usual system of adequate feeders has been neglected. There is a consequent loss of head, averaging 24 feet, in the denser districts, which will rapidly increase, and a loss of supply in more elevated sections. The use of unprotected cast-iron pipe has also produced its common result in increased friction of flow, through reduced calibre by tubercular accretion.

The cost is thus stated to January 1st, 1862:

Engine-house and engine	$72,999 65
Reservoir	71,809 25
Distribution (with service)	239,721 23
Contingencies	13,754 20
Total	$398,284 33
Issue of 6 per cent. Water-Bonds	$375,000 00

The consumption of water, as reported for the year 1862, by some 26,000 inhabitants supplied, averaged 51 gallons each per day.

It is quite evident, from this state of the supply, that immediate action is required to provide against impending contingencies, and to meet the coming demands of an increasing population; and the prospective supply is to be determined by what is now necessary, and certain to occur in the future.

INCREASE OF SUPPLY.

This will depend, as to its measure of extent, on the increase of population, of density in buildings, of water use by consumers, and of water introduction to buildings now erected.

The census of Hartford City was, in 1850, 13,555; 1855, 24,024; 1860, 29,207; and if it be assumed that the percentage of increase from 1860 to 1870 will equal that from 1850 to 1860, or 115 per cent., the population will then be 62,795; at the same ratio, in 1880, it will be 125,580. If the ratio be diminished beyond 1870 to but 50 per cent., the number will be 94,192 in 1880. While results like these seem formidable, the experience of cities where manufactures, superior business facilities, and pleasant residence attract population, abundantly confirms the theory of sytematic increment. Brooklyn, from 1830 to 1860, has increased by ten year epochs, 116.7, 150.3, and 87 per cent., respectively; New York, for 1850 and 1860, increased 64.8 and 56.27 per cent.; Philadelphia increasing 54.27 and 65.43 per cent. in the same periods.

It is proper also to assume that as the city grows older it will follow the course of other and larger cities as to increased ratio of water use. The average of 1862 is not absolute for 1870 and 1880. While a city like Philadelphia is using about 60 gallons per inhabitant, Boston is using about 90. If, then, Hartford now uses 51, the ratio for the future must be taken at a higher rate.

With the population estimated for 1870 in Hartford, the average use of 64 gallons would require a daily supply of about 4,000,000; and whether the number then reaches 62,800 or not, but a short time can elapse until it does, and in the experience of a water-works, ten and twenty years are brief subjects of note. The consumption of water, for the year 1862, increased 248,121 gallons on the use for 1861, and the ratio of increase is compound rather than simple, the increase from 1860 to 1861 being 201,815 gallons; but at a simple rate of increase in 11 years, or 1873, the consumption will be 4,076,302 gallons. It would not be at all prudent, then, to make any estimate on any daily supply less than 4,000,000 gallons, and while this is made, due regard should be had to inevitable extensions. Jersey City, with the same population as Hartford, is using 2,000,000 gallons daily, and is laying a new line of 36-inch main alongside the 20-inch now in use.

IMPROVEMENT OF DISTRIBUTION.

It will be observed, by reference to the distribution-schedule, that the largest feed-main is but 12 inches in diameter, the effluent lines from the reservoir being a 12 and an 8-inch pipe; and that the proportion of 12 and 10-inch pipes is very small as compared with the 6 and 4-inch. Three lines are laid across Little River, being a 6-inch to Rifle street, an 8-inch at Ford street, and a 12-inch at Main street.

In consequence of the limited calibre of these feed-mains; the tortuous lines, abrupt bends, and undulating grades by which the outer districts of the supply are reached; the effect of increasing draught, and other causes, it follows that there is a loss of head now encountered in all directions of use, and more particularly in the more elevated, distant, and sparsely settled localities.

Reference to the experience of other cities shows that much inconvenience is suffered from similar neglect of an adequate system of large feeding mains, and reference to cases of correct practice shows the common use of 16, 20, 24, and 30-inch mains, for this purpose, in order to save in effective head at the several districts of supply in which the smaller pipes are grouped. Philadelphia is a notable instance of care and forethought in this respect.

Evidently, then, adequate provision is at once required for an evil annually growing more serious, and must be made in connection with any increase of supply which may be adopted. A feeding system on both sides of Little River, by more direct, independent, and larger mains, is a matter of necessity, and should be arranged with a view to future extensions.

INCREASED STORAGE.

The present reservoir storage is equal to about six days consumption. With a rapid increase in demand this ratio will annually decrease; and the advantages resulting from a more complete safeguard against accident, and a corrective for occasional state of river supply, render an improvement in this respect desirable. This may be had in part by an increase in height of the Lord's Hill reservoir, which would readily admit some ten feet or more of new masonry-protected sidewalls; but it is believed that the construction of the new reservoir herein suggested will much more effectually meet this requirement.

TROUT BROOK PLAN.

A report was made in March, 1862, to the Common Council of Hartford, in which preference was given to a supply by gravitation from Trout Brook. In this report it was stated that 2,000,000 gallons would be sufficient for the present and prospective population. In this report no provision is made for any improvement in distribution mains. A reservoir is estimated for on Prospect Hill, two miles west of the city, of 4,000,000 gallons capacity, which is said to be "unnecessary." No estimate is made for any engine repairs or renewal, or annual operations, from which it is concluded that Trout Brook is to be taken as a substitute rather than an "additional" supply, and that the brook reservoir is relied upon for storage and elevation.

In a report made February 23, 1863, the reservoir at Prospect Hill is retained, and may be considered part of the general plan; Lord's Hill reservoir is also retained. From both these documents it appears that a large balance of expense favors the gravitation substitute.

As this plan is devised for an entire daily supply of but 2,000,000 gallons, for which it proposes an actual cash outlay of about $112,000, it is difficult to understand how it can be advised for adoption, if regard is paid to the immediate wants of the city without reference to any future increase, since the engine which is to be abandoned, with its costly building and appurtenances, is itself capable of pumping nearly or quite this amount, and the interest of the proposed expenditure considerably exceeds the annual cost of pumping.

Mr. McElroy thus speaks of the quality of the water of Trout Brook: "The character of the several currents of a running stream may be affected by its conditions of surface and underground supply, its relative depth, temperature, velocity, organic and mineral impregnation, solar exposure, and otherwise; so that different constituents would be shown by analysis of different currents in the same or different localities of flow; and it is also plain that a very small fraction of the entire body cannot be taken as a correct index of general quality. So far, however, as the analysis of a demijohn full from the locality of the proposed dam can be compared with the same quantity from the Connecticut river, it appears that the latter is the best water, having 1,051 grains of organic matter in 2,568 grains of solid matter per gallon, while Trout Brook has 1,634 grains organic matter in 3,268 grains solid matter per gallon. Its quality, in itself, is admirable by this analysis, and open to no reasonable objection.

"But it is a matter of plain and common sense deduction from known causes, and of direct demonstration from abundant experience, that the quality of any running stream cannot be a correct index of its quality,

if aggregated for long periods of time in capacious and shallow reservoirs, and exposed to the action of light and heat, while constantly accumulating mechanical, mineral, and vegetable impurities. Aside from the advantage of storage, the object of all water-works reservoirs, is to depurate the supply, by giving some currents the advantage of subsidence, while others are more fully impregnated; the surface waters being comparatively free from the conditions of the greater depths. If such reservoirs could be covered for protection from the sun, properly aerated and circulated in content, and blown out at the bottom from time to time, storage would be an improvement; but until these conditions are properly realized, storage, beyond a narrow limit, cannot but be regarded as objectionable, though lakes and reservoirs of great depth, supplied with large quantities of pure rain-water, generally escape the effects of different conditions. We know this by unmistakeable experience at Brooklyn, and it has also been observed in New York, Boston, Albany, and other cities of this country and Europe, and prominently in your own vicinity, at New Britain. This subject, which is of great moment, in a case of this kind, is fully presented in the documentary evidence given in the appendix, where it may be examined by those who choose to profit by experience. Evils, from which the Connecticut, on this question of quality, flows comparatively free, hang over this plan with no trivial portent, which proposes to pond about 121,000,000 gallons in a reservoir of 26 acres surface, in which two-thirds of its contents are above 15 feet deep.

"*Quantity.*—Trout Brook, at the point five miles west of the city, where the dam is located, is formed of two branches of short length and rapid fall, which descend from the Talcott mountain range, with abrupt feeding slopes; it is subject to rapid and serious changes in flow. Professor Silliman estimates the rain shed of both branches, above the dam, at ten square miles, giving an average theoretical flow per day of 7,000,000 gallons. As these branches do not exceed one and a half miles in length as mapped, I am at loss to understand how the drainage area can extend nearly 6 miles north and south; but if we assume this estimate correct, the reported gaugings, which fix the minimum flow of the stream at 500,000 gallons per day, also, according to the custom of our profession, determine its value as a source of supply.

"Whatever surplus passes over the dam in seasons of freshets or extraordinary rain, cannot be considered available, and beyond the storage of the reservoir proper, must be secured by upper reservoirs of storage, or lost; and no estimate or provision is made in this plan for them. Professor Silliman mentions a change of flow in this stream, within a space of thirty-five days, from 6,000,000 to 600,000 gallons, and also refers to a drought of six weeks. It is quite evident, then, that for the usual periods of drought, which often exceed six weeks, the city must depend only on the minimum supply and the storage under this plan.

"While the total contents of the pond is 121,000,000 gallons, there is a prudential limit to the depth to which it may be drawn down; and from the formation of the northern basin, and the loss of head shortly to be noticed, this limit is certainly above fifteen feet depth, which would make the storage, by the cross-sections, about 86,000,000, to which, adding Prospect Hill and Lord's Hill reservoirs, we have a total of 98,000,000 gallons. With 2,000,000 gallons demand per day, this would give 65 days' supply, but with 4,000,000 gallons demand, 28 days' supply, so that a drought of but four weeks would exhaust the available sources, and compel the city to wait the visitation of the rainy season for water. Can it then be in any sense prudent to depend on a plan under these contingencies, with any regard whatever to the future?

"This calculation does not include the daily loss by evaporation and filtration through the gravel formation of the ravine, which is most important when the quantity diverted and lost can be least spared.

"*Certainty of Supply.*—The rapid fluctuations in flow to which this stream is subject, from the character of its feed sources, place it, so far as its quantity of flood discharge may go, in the category of mountain streams, which jeapordize dams, gate-houses, and other structures—a contingency which may be enhanced by breaking up the ice-sheet of the pond, and by the extraordinary height of the proposed dam, which is at one point fifty feet above bottom. The line of the supply main is also crossed by several swift or large streams, which add to the contingency of delivery, and should not be overlooked; and this objection, as to remote locality, diminished certainty of supply, expense of line and of supervision, and difficulty of access, construction, and repair, is common to nearly all gravitation supplies. The Boston aqueduct is in continual jeopardy; extra guards have been placed on the Croton aqueduct and the Washington aqueduct, for protection from sources of risk unknown to pumping supplies: and like supervision is incidental to all surburban lines of supply.

"*Effective Head.*—For the site of the dam proposed in the report, the level of the pond is stated at two hundred and fifty feet above low water. As this is five miles distant from the connection with the distribution, and the loss of head per mile depends on the diameter of the supply main and the quantity of flow, the effective head at the city will be proportionately diminished. The line of main passes down the Farmington road through West Hartford, a road constantly undulating, being intersected by low ravines and high hills. Each depression tends to collect sediment, and each summit to collect air, both retarding the flow, but the latter by far the most seriously. Proper attention to blow-offs and air-valves will remedy this evil, but such attention is rarely bestowed in practice.

"For a supply of 2,000,000 gallons per day, a main 16 inches in diameter is estimated, and if the engine-power is dispensed with, must be relied on by the city. If the Lord's Hill reservoir is to be supplied by it, no increase of head will be realized, unless it supplies the distribution direct, using this reservoir and that at Prospect Hill as reserves. In that case the main must deliver its supply in the twelve working or sixteen waking hours of the day; and at the first rate the effective city head, not including allowance for undulations of main, will be 115 feet, and at the second rate, 170 feet. But when the city requires 4,000,000 gallons, a second main will be required, since the delivery of 4,000,000 gallons in sixteen hours would reduce the head to twenty-five feet. It would be much more advisable and cheaper to lay a twenty-inch main, which will deliver 4,000,000 gallons in sixteen hours, with an effective head of 150 feet, theoretically, except in those cases of annual drought, when the main reservoir will be drawn down to furnish the supply. It is evident, then, that the time is not far distant when the effective head, under this plan, will not much exceed at Lord's Hill, without regard to the remote districts of supply, the present reservoir head. If the delivery of the twenty-inch main is required in twelve hours, the effective head will be reduced to 89 feet; and in case cast-iron pipes are used, the natural internal accretions will, in time, seriously diminish this theoretical head."

The cost of the Trout Brook plan would be, in all, $187,448, distributed as follows:

The first item of land damage will depend on the quantity taken, the facility with which possession is obtained, and the ultimate cost per acre. The quantity will considerably exceed the submerged area, probably reaching forty acres. As the road at the head of the pond will be flooded about seven feet, the cost of a new road is to be included. This amount may not exceed $3,000.

The second item of water-rights, involving not only mill-rights but riparian damage along the stream, below the dam, is of a more complicated character, since the distance is about six and one-half miles, and the fall about 200 feet. The amount of water-power available controls the claim for damage.

At Brooklyn $5,000 were paid for some grist-mill damages; in the estimate of Lowell mill-power, recently submitted in the Washington aqueduct arbitration, the representative *cost* capital was $29,333. The cost of water-rights at Albany was $100,000, at Baltimore $236,958, at Boston $211,930, at Brooklyn $126,200, at New York $173,955, at Philadelphia $236,958, for supplies ranging from 12,000,000 to 33,000,000 gallons per day as a minimum. It would not be safe to take this item at less than $20,000.

For the reservoir and its feeders, careful provision should be made for thorough grubbing, soiling, and mucking. This item, on one of the Brooklyn ponds, averaged about $2,000 per acre This item, for careful work, judging from the description of the stream as reported, and the extensive areas affected, cannot be taken below $20,000.

The dam, which is exposed to very severe strain, and must be not only carefully built, but protected from the action of surface waves and floods, will cost for 32,000 yards embankment at 30 cents, $9,600; for 1,569 yards slope masonry at $3 50, $5,393; for 2,102 yards puddling at 50 cents, $1,056; for masonry apron 1,600 yards, at $4, $6,400; for gate-house and fixtures, $1,000; for fencing, $1,200; and for keeper's house, $2,000; being a total of $26,648.

The cost of twenty-inch cast-iron main, including ordinary trench work, cannot be taken at less than $4 50 per foot. To this is to be added an item for right of way, across private property to the Farmington road, with deep trenching near the dam, and the cost of masonry creek crossings, blow-offs, air-valves, stop-cocks, and other attachments. As the engineer of the "Jersey City Water and Gas-Pipe Company" is stated to have proposed to lay complete the sixteen-inch cement pipe line for $2 40 per foot, or about the card-price of their pipe and of the pipe manufactured under Knight's patent, "exclusive of freight and trenching," and the difference between twenty-inch cast-iron and cement pipe is stated in the Report of 1862, at $1 25 per foot, we will assume these extraordinary prices correct for purposes of comparison, taking the twenty-inch pipe laid complete at $3 25 per foot, or for 26,400 feet, $85,800.

To this amount must be added the capital represented by the annual salary of the keeper, the repairs of the several structures, and the supervision of the line of main, which would not vary much from $15,000.

The plan also includes the reservoir at Prospect Hill, of 4,000,000 gallons capacity, which has no utility except as a reserve. This was estimated at $13,703, to which adding 25 per cent. for increase in prices, we have about $17,000.

The summary of cost will then be, for

Land Damages,	$3,000
Water Rights,	20,000
Grubbing, Mucking, &c.,	20,000
Dam and Structures,	26,648
Twenty-Inch Main,	85,800
Prospect Hill Reservoir,	17,000
Capital for Supervision, &c.,	15,000
Total,	$187,448

In making any estimates of this kind of work, as to pondage, dam, structures, main, and damages, it is advisable to provide liberally for contingencies. Whenever legal services are retained and questions of occupation or injury are carried into court, the items of expense rapidly accumulate; wherever contracts are taken too low, the city suffers in the end; and during construction, storms and floods are to be apprehended.

PLAN PROPOSED.

From this examination of the general features of the present and prospective supply, and of the plan of substitute presented, we may take up the subject of improvement in detail, for suggestions as to the distribution, the increase of supply by engine-power, and the increase of reservoir head and storage.

Distribution Feed Mains.—An important improvement in house supply may be made without involving much cost, by forming the present service into districts, and connecting them with feeding mains. A general plan of this kind should be adopted as the guide for future extensions, but need not be fully executed at present; and this general plan should be based on a ridge line of large mains, northerly and southerly from Lord's Hill, with a central line easterly, with secondary feeders of smaller calibre, branching from them at proper distances and at right angles, or nearly so.

For the present it will be sufficient to provide the reservoir with a large effluent connection, from which three lines of 16-inch main may be eventually fed; the central line to be arranged at once by appropriating the present force main down to Main street, and the southern line to lead across the Ford street bridge, then through Washington street to Park; the northern line is not yet needed. The balance of the force

main, not used for the central line, may be applied to the southern, and the pipes which will be superseded in use, will answer for other extensions. In process of time, 10-inch branches may be connected, as lateral district feeders. The 16-inch service must also connect with the new force main herein suggested.

The district west of Washington street, commanded Zion's Hill, on which a reservoir is also recommended, will be considerably improved when the city is using 4,000,000 gallons per day, and will require its system of distribution; but as this item is properly chargeable to extensions, rather than increase of supply, it need not be added to the estimates for either plan under discussion.

Of the force main, if applied to this plan, there will be about 2,250 feet to lay on the southern line, which has a total length, from Oriental Passage and High street of about 5,400 feet. The estimate of cost will then be, for

Relaying 16 main,	2,250 feet, $1 00,	$2 250
New cement "	3,150 " 2 75,	8,663
Stop-Cocks, &c.,		800
Total,		$11,713

exclusive of arrangement at the reservoir, chargeable to reservoir account.

Engine Power.—The engine and boiler house admit considerable extension of engine space; with a cylinder as large as that of the present engine, now working under great expansion, there will be no difficulty in substituting two enlarged pumps, for the present small ones, so as to bring the delivery up to 3,000,000 gallons per day, or 1,500,000 for 12 hours; and this change would give room for a second engine on the more compact and powerful plan of the Brooklyn engine, capable of pumping 2,500,000 gallons per 12 hours or, 5,000,000 per day, giving an aggregate capacity of 8,000,000 per day. Some improvements will be required in the river delivery to remedy the inflow of sandy or roily water.

From the proposals heretofore made under the head the cost may be taken at $42,000.

It is also suggested that the present force main be transferred to the distribution, and a new line of 24-inch main laid to the reservoir, to which both engines may be connected; the main to pass up Pleasant street, and on garden fence lines across the block to High street, through Oriental Passage and Walnut street to Spruce, across the railroad, south of the railroad buildings, to and through Myrtle street to the reservoir, being a total length of about 5,400 feet, of which some 1,100 feet will be through private property uninjured by its line. If laid with cement lined pipe of Ball's or Knight's patent, the cost will be, for

5,400 feet 24-inch main, at	$4 50,	$24,300
1,100 " right of way,	1 50,	1,650
Total to reservoir,		$25,950

To this must be added about 3,700 feet of 12-inch pipe, as the force main extension, from the 16-inch line at Park street, in Washington, to the Zion's Hill reservoir, being for cement lined pipe at $1 50 per foot, $5,550, or $31,500 in all.

Zion's Hill Reservoir.—In connection with this general plan, and as an exclusive source of supply to its immediate vicinity, though connected with the main distribution by stop-gates, the construction of a reservoir on this eminence is proposed with an elevation of about 165 feet, and containing about 12,000,000 gallons. Auxiliary reservoirs of this kind are in common use in Europe, and in some cases in this country, as at Brooklyn on Prospect Hill, at Philadelphia, San Francisco, and other cities, and they have the advantage of increased capacity and head, with much economy in special supply, limited to the head of the particular district. They are valuable also for such contingencies as extraordinary fires, repairs to main reservoirs, and otherwise.

This reservoir may be supplied in three ways:—by an independent line, through Front street, Retreat avenue, and Vernon street, from the engine-house,—by an auxiliary steam-engine, near Washington and Baker street, staking water from the 16-inch main,—and directly from the proposed 24-inch force main at High street, by using the 16-inch line through Washington street, and the 12-inch extension, above estimated. The latter would be the most economical in capital and in coal account, if the stop-gate branches, from the 16-inch main, are properly adjusted while in use as a force main, and the Lord's Hill reservoir is shut off. The quantity required for this district in 1870, would not probably exceed one-fifth the entire city supply.

Without accurate survey of this location, a close estimate of cost can not be made, but judging from plans made for other localities, and a personal inspection of the site, I think a reservoir of the capacity named, could be built and connected with its special district for about $30,000, if judiciously planned; and it would have the advantage of admitting considerable enlargement.

Cost of Pumping.—On the basis of 4,000,000 gallons delivery per twelve hours, this expense may be thus calculated.

The pump duty of engines of the Brooklyn and Hartford pattern has been experimentally determined as equal to not less than 600,000 pounds of water raised one foot high with one pound of coal. If we deduct ten per cent. from this to cover various wastes, and take the practical standard at 540,000 foot-pounds, we have 64,748 gallons raised one foot per pound of coal. Taking the prism lift of the present reservoir at 119 feet, as results from experiment, plus 24 feet pumping friction, we have 4,000,000 gallons, x 143 feet = 572,000,000 raised one foot ÷ 64,748 = 8,834 pounds of coal, or about four tons. The price of coal, though a matter of recent speculation, will not probably average more than $5 25 per ton in the future, for this use. The attendance beyond what is now required, is limited to increased coal use, and the items of oil, waste, repairs, &c., are nearly proportionate to use. We have then, per year, for

Four tons coal, 330 days, at $5 25,	$6,930
Attendance,	2,100
Oil, waste, &c.,	268
Repairs, ten per cent. on cost,	570
Total,	$9,868

To lift 800,000 gallons to Zion's Hill, being with friction, about 50 feet higher, will cost 800,000 x 50 = 40,000,000 ÷ 64,748 = 618 pounds coal x 330 days = 203,940 pounds ÷ 2,240 = 91 tons per year. At $5 25, the additional coal account will be $478. For an aggregate annual cost of $10,346, the representative capital will be $172,433.

The aggregate of the items for the entire modification suggested, which involves an increase of capacity of about 6,250,000 gallons per day, with a total capacity of 8,000,000 gallons; an actual increase of delivery of 2,700,000 gallons per day; an increase of storage of 12,000,000 gallons; the re-arrangement of the distribution, and forty feet increase in head, will be for actual outlay in

Distribution feed mains,	$11,713
Engine power,	42,000
Twenty-four-inch main, &c.,	31,500
Zion's Hill Reservoir,	30,000
Total,	$115 213

To this must be added the difference of capital between the present annual expenditure of $5,777 17 for pumping, or a capital of $96,286, and the total pumping capital of $172,433 or $76,147. The representative cost of these improvements will then be $191,360. And this amount should be credited with the value of the sixteen-inch force main, and all other pipes through its use transferred to distribution use or extension; it must also be observed that the capital for pumping expense is not reached until 4,000,000 gallons are actually pumped in twelve hours, the account for 1870 being entitled to a credit for this item of saving. For supply beyond 4,000,000 gallons per working day, the cost will be increased by the coal account, without any material addition for attendance.

COMPARISON OF PLANS.

The Connecticut river supply, when the inlet-pipe is properly arranged, is open to no valid objections as to quality, while its quantity is practically inexhaustible. The modification of the feed-mains will make the lower reservoir much more useful to the denser part of the city, while the elevated reservoir on Zion's Hill fully meets all future requirements as to storage and special head, and also provides for occasional reservoir repairs. The use of two engines answers all the objections of contingent accident, hurried repair, and overdriven attendance. An important saving will also be made by the use of the enlarged and shorter force-main. And all these advantages, covering a capacity of supply of 8,000,000 gallons per day, from works within the city limits, and under immediate inspection and control, may be had for an actual expenditure of $115,213.

It can only be necessary to suggest, in this connection, that after the capital is expended for a supply, the more rapidly consumption of water increases, the more surely is income realized, and all experience advocates the encouragement of consumption, and of facility for supply. The rapid increase of the city and of water use, must be regarded as a direct benefit to the tax-payers; and any restriction of available supply, as a direct injury. This consideration bears with great force on the scale of capacity herein suggested.

The report of March 8, 1862, contemplates a supply of 2,000,000 gallons per day, being somewhat in excess of present consumption, and about two-thirds the capacity of the present engine, with an alteration of moderate expense. If this supply was intended as merely "additional," a capital of $96,286 should have been added to the estimate of its cost to represent annual expense; and if it was intended as a substitute, it should be charged with the cost of the works abandoned, $73,000, or such loss as their disposal would entail.

The necessity of the amendment to this plan, as an adaptation to future wants of no remote character, which we have suggested in the enlargement of the supply main, as a requisite not only to future delivery but to actual use of the distributing reservoirs at the time of increased demand, has been already presented and discussed; it must be admitted if Hartford is to follow its previous law of increase, and the law of other cities. Granting, then, for present argument, a capacity of 4,000,000 gallons per day, it cannot be claimed that this capacity can be much enlarged, and the time will therefore come, and within fifteen years, when another source of supply must be obtained.

On the basis of 4,00,000 gallons supply, the actual cash outlay under this plan will be $172,448. To this must be added $11,713 for the modification of the distribution. and $15,000 capital of suburban supervision, making in all $199,161. For the river supply, with twice the capacity, under much superior head, the actual outlay is $115,213, and the entire pumping capital $172,433, or in all, $287,646. Add to the gravitation plan $73,000 for works abandoned, and we have $272,161 as its representative cost. There is, therefore, but $15,785 difference in capital against the river supply, with $57,225 actual outlay in its favor, and a balance of 4,000,000 gallons daily capacity.

The matter of cost is the least objection to the gravitation substitute. The minimum supply during the dry seasons of the year is entirely too small to warrant any reliance on its quantity, and would involve the city in serious difficulty, or serious additional expense; and the objections, which are more than conjectural, to the quality of the supply under storage, also furnish grave and conclusive arguments against its use.

Mr. McElroy advises the modification of the river supply on the general plan suggested, even if there be a large balance of cost in favor of the gravitation plan.

UTILIZATION OF SEWAGE.—A petition has been presented to the House of Commons of England from the Vestry of St. Mary, Lambeth, London, in reference to utilization of the metropolitan sewage. The petitioners pray that a select committee be appointed to inquire into the subject prior to any plan being adopted by the Metropolitan Board of Works. This looks very much as if the Vestry incline to the opinion of the worthlessness of sewage manure—that is—compared with the cost of applying it.

LAMPS WANTED IN FRANCE.—A late number of the London *Oil Trade Review* says that accounts from France speak of a great dearth of lamps for burning light oils, especially the better class of goods. A hint like this will be sufficient to direct the energies of our American manufacturers to supply this deficiency. Large as is the demand for American lamps abroad, we are assured by correspondents that additional numbers might be immediately sold.

SEWERAGE OF NEW YORK.

At a recent meeting of the Common Council of this city, the following communication was received from the Croton Aqueduct Department, in relation to the defected manner in which the sewers are constructed:

CROTON AQUEDUCT DEPARTMENT,
June 1, 1863.

To the Honorable the Common Council:

The Croton Aqueduct Board have, on frequent occasions in their annual reports, and by special communications, endeavored to show to your honorable body, in contrast with the present irregular and objectionable manner in which the public sewers are now and have been since their first introduction, ordered and built, the salutary and permanent benefits that would unquestionably be experienced from the adoption of systematic plans for the sewerage of the undrained districts of our city, and by the construction of main and branch sewers of properly graduated dimensions, in harmony therewith. Deeply impressed with a knowledge of the sanitary and also of the pecuniary importance of this undertaking, and daily witnessing the evils and otherwise avoidable expense arising from its neglect, they believe it to be a matter of simple duty to again bring the subject to your notice, and to respectfully, but urgently ask for a favorable consideration thereof at your earliest convenience.

By the legislative act of 1849 (under which this department was organized), this Board was charged with the construction of sewers, subject, however, "to the orders of the Common Council, as to the times and places of building new sewers, and to the general plan which has been, or may be adopted for the sewerage and drainage of said city."

The framers of this law undoubtedly foresaw, that any plan which might be adopted for the general introduction of water into our city, would of necessity be imperfect unless careful provision was at the same time made for its removal, and the necessary authority was, in accordance with this wise forethought, granted to your honorable body, to initiate and perfect a general plan of sewerage for the whole city.

The absolute necessity of such plan has been frequently urged upon your honorable body, but as yet no authority has been given to this Board to take any step in the matter. So much has been said heretofore on this subject, that the Board would here simply add that the time has come for some definite action on the part of the Common Council, if they would save the city from incalculable expense, and the operation of our sewers from confusion and inefficiency.

The topographical features of the lower part of the city have, fortunately, served in some degree to obviate the bad results which otherwise would inevitably have followed our want of system in this regard.

The upper part of the city has not the same topographical advantages to offset imperfect arrangements, and no time should be lost in guarding against future difficulties and useless expenditure, by the adoption of a system of sewers based upon correct principles. In this respect the city of New York, instead of being the one to lead in physical science and judicious expenditure in this branch of public work, is far behind not only the cities of Europe, but some of the comparatively smaller towns of our own country.

It is earnestly hoped that your honorable body will, at an early day, give to this Board such authority as will be necessary to enable it to undertake and complete such surveys as will be requisite for the purpose alluded to. To facilitate your action in this respect, we respectfully submit a draft of a resolution for your favorable consideration.

A. W. CRAVEN,
For the Croton Aqueduct Board.

Resolved, That the Croton Aqueduct Board be, and they are hereby authorized to undertake and complete, at the earliest possible day, such surveys and plans as in their opinion may be necessary for the establishment of a proper system of sewerage for the present undrained districts of this city, such plans, when completed, to be submitted to the Common Council for their approval.

The President moved that the paper be read and published in the Corporation papers, printed in the minutes, and referred to the Committee on Sewers.

Which was carried.

FIRE AND EXPLOSION FROM PETROLEUM.

On the night of Saturday, May 23d, a terrific explosion, followed by a fire, in which several buildings were burned, occurred in the town of Devonport, England. By this catastrophe Mr. Emmett, grocer, lost his life. The facts of the case were as follows:

Mr. Emmett took a lighted candle on the evening in question and entered his cellar for the purpose of drawing some "turpenzine"—one of the innumerable family of hydrocarbons distilled from petroleum. This turpenzine is very volatile, and since the high price of turpentine has almost precluded its use in the arts, it has been extensively adopted as a substitute, for painters' use. Being exceedingly volatile, paint applied with it soon dries. Within a minute after Mr. Emmett's descending into the cellar to procure some turpenzine to fill an order, a loud explosion was heard, and flames burst out of the building which was consumed, as well as several others in the vicinity. Mr. Emmett was never seen after the explosion until his remains, charred and burnt to a crisp, were found after the fire had been extinguished.

The London *Grocer* makes some comments upon this unfortunate occurrence, from which we quote:

The lamentable accident which occurred at Devonport on Saturday night last, by which a valuable life was lost in a conflagration, hardly paralleled for extent in that town, requires some comments at our hands. In the haste and flurry consequent upon an accident such as that to which we now refer—and concerning which particulars will be found in another part of this impression—it is not wonderful that incorrect impressions have been conveyed by many of the reports to newspapers; but we were assuredly not prepared to discover such a total misconception of chemical principles, and, what is more, chemical facts, as revealed in the assertion that poor Mr. Emmett lost his life through the explosive combustion of vapors from the hydrocarbon cazeline. Not only is that simply impossible, but, what will be more satisfactory to the general public, the evidence on record completely acounts for the much-to-be-regretted calamity. To speak or write disparagingly of the dead is an ungracious matter; nevertheless, there are times and occasions when not to do so is to foster danger, and perpetrate an injustice to the public. If ever an individual lost a lift through culpable negligence, that individual was poor Mr. Emmett. How stands the case? Bearing a light, he descends into a cellar to draw off and bring away some turpenzine—a very volatile and highly inflammable hydrocarbon. An explosion is the result; but, as happens in most similar cases, the exact particulars of the explosion are not to be discovered. Mr. Balkwill, writing from Plymouth to the editor of the *Western Morning News*, suggests that the explosion may not have been referable to the vapor of any hydrocarbon liquid, but to fire-damp, resulting from the escape of ordinary combustive gas. The result *may* have been as Mr. Balkwill suggests; but, looking at all the evidence before us, this seems to us improbable. Had no gas-pipe existed within a mile of the fatal cellar, the accident would have happened as it did happen, taking into consideration the nature of the contents of the cellar. Any man intimately acquainted with the volatile nature of either turpenzine or turpentine would no more have ventured to draw off a portion in a close cellar by lamp or candle light than he would have dared to go into a powder magazine bearing a lighted cigar. In some respects turpentine and turpenzine are more dangerous to approach in this way than gunpowder, inasmuch as, whereas gunpowder can only be ignited by bodily contact with igneous matter, it is the invisible vapor of the volatile hydrocarbons which by ignition causes the explosion. Again, as concerns gunpowder, the violence of explosion is proportionate to the quantity of material ignited, whereas, as regards the volatile hydrocarbons, the violence of explosion is proportionate, not to the amount of original material, but to the amount of vapor liberated, and the due admixture of that vapor with atmospheric air. Turpenzine is, as many of our readers need not be informed, a substitute for turpentine. Were both turpenzine and turpentine not extremely volatile, they would be both totally unadapted to the purposes for which they are designed. Everybody knows that when a coat of paint is laid on it is intended not to remain wet permanently, but to dry. Now if turpenzine and turpentine were not volatile, paint containing either of these would not dry. Extreme volatility, then, we repeat, is a necessity of the case, and, with extreme volatility, a proportionate degree of inflammability. Liquids such as these should never, under any circumstances, be drawn in close situations like cellars by candle, or lamp, or gas-light at all. If ignorant or incautious people will violate plain injunctions, dictated by the chemical nature of the volatile hydrocarbons, they must accept the consequences; and the public must lay the poor consolation to heart of acquiring wisdom, through the grim records of coroners' inquests, which might have been acquired through five minutes' study of a few immutable facts.

Fully convinced as we are that the mineral hydrocarbons are destined to supplant, in no long time, vegetable and animal oils, whether for porposes of illumination, painting, or lubrication, a few plain, common sense remarks concerning these wonderful compounds, will certainly not involve labor lost or time thrown away. In the first place, then, we would advert to the prejudice sought to be raised against the products of the North American oil-wells, because of some assumed remote danger attaching to them. Of course, we need not address any observations in refutation of this to individuals who have mastered the rudiments of chemistry. It is to the public in general that our remarks on this subject are necessary, and, addressing ourselves to the public, suppose we say the proposition were gravely enunciated that steaks and chops ought to be banished as dangerous, because prussic acid can be got out of steaks and chops; or that sugar and treacle should no longer mingle with our food because oxalic acid is actually made from sugar and treacle? Well, the argument sought to be raised against the North American well oils is pretty much in the same category, as a short recapitulation will make plain. A rough, semi-fluid material, more or less colored, first exudes or is extracted from the earth—such is the first phase. This material is a compound or mixture of many—it may be hundreds of hydrocarbons, as chemists call them—bodies, some solid, some fluid, some so extremely volatile that they rapidly dissipate in vapor when exposed to atmospheric air, others so fixed that they cannot even be distilled, except under special conditions, of which we see an example in the solid paraffin—the waxy-looking body of which candles are made. Now, from the raw material as a starting-point, the chemist works in his manufacturing operations. Distilling at a low temperature, he separates each and every fluid present that can be thus separated, and sets the product aside, as containing liquids far too volatile for illuminative purposes, though admirable for other uses; of this class of volatile fluids is turpenzine. He distils again at a higher temperature, and obtains products not too volatile for combustion, amongst which is cazeline; and, finally, he deals with the solid remaining compound in a way proper to eliminate the beautiful waxy paraffin. This series of operations leaves nothing to chance; every step of it is fixed, unvarying, and certain; and, if cases have occurred during the earlier days of mineral oils, cases in which to swell the melting bulk of combustive fluids, some of the dangerously volatile hydrocarbons have been studiously not driven away, we can assure the public they are not likely to occur again; special wants having arisen for the highly volatile hydrocarbons totally independent of lamp illumination.

WHAT IS IT?—Under the heading "Important to Gas Consumers," the *Tribune* of 12th instant says: "We yesterday witnessed at the City Hall a series of experiments with a novel apparatus, invented by Geo. W. Thompson, for controlling the consumption of gas, and at the same time furnishing an increased and uniform light, without regard to the pressure upon the gasometers at the gas-houses. The apparatus consists of a self-acting stop-cock, regulated by a movable diaphragm placed just below the burner. At high pressure the gas pushes up the diaphragm and lessens the orifice through which the gas passes, and upon a diminution of pressure the diaphragm falls, again enlarging the orifice. A number of tests were made under heavy and light pressures, by means of a portable gasometer, yet the apparatus always acted with the ut-

most nicety. Its advantages are in the prevention of waste, every particle of gas being consumed, instead of flying off. No matter at what distance from the gas-ometer, whether in the basement or in the attic, the light is uniform and cannot be wasted. The Common Council are about adopting the gas-controller for the street lamps, as much complaint is made in regard to the burners now used. The experiments of yesterday were witnessed by several officials, who expressed themselves pleased at the result."

PATENTS.

UNITED STATES

38,500.—Charles H. Peters, Cincinnati, Ohio, Combination of a Chamber Lamp and Lantern:

I claim, first, The chamber or handled house-lamp, A B, provided with studs, C C' C'', projecting from the upper portion of the reservoir, and adapted to interlock within the gated-bottom of a lantern case, F, the whole being constructed and adapted for the separate uses of a lantern and a house lamp, as set forth.

Second, I claim the described arrangement of the guards, H, and apertures, I, for the double purpose of retaining the panes and of deflecting the indraft, substantially as set forth.

38,506.—H. R. Scott, Plainwell, Mich., for a Water Elevator:

I claim the combination and arrangement of the bevel wheels, b b c c, oscillating shaft, a a, lever, k, crank, o, and drums, h h, substantially as described.

38,521.—James Watt, Buffalo, N. Y., for Utilizing the Waste Heat of Puddling Furnaces, &c., in generating Steam:

I claim the location of the boiler at the end of the furnace and on a horizontal plane therewith, so that the surplus heat and slag from the furnace may be directed into a fire chamber, B', within the boiler, for the purpose and substantially as described.

38,523.—Gustav Wedekind, Philadelphia, Pa., for Incombustible Paper Shades for Lamps:

I claim a paper shade, the whole interior surface of which is backed by mica, and the two layers of paper and mica are caught and held at the top and bottom thereof by a thin metallic strip or its equivalent, substantially as herein described and represented, and for the purpose described.

38,531.—Abraham Contes & Martin V. Osborn (assignors to themselves and H. H. Babcock), Watertown, N. Y., for a Water Engine:

I claim, first, The combination with the induction pipe of a water engine with the shifting valve, b, and with the air chamber of the auxiliary pipe, L, and valve, K, by which the concussion of the water upon the valve and piston is made to supply a portion of water to the air chamber, substantially as and for the purpose set forth.

Second, The construction of the valve, b, of a single flat plate in combination with the conical or cylindrical heads or flanges, n n, substantially as set forth.

Third, The combination of the flat valve, b, with a water engine, substantially as set forth.

38,537.—Timothy Raymond, Brooklyn, N. Y. (assignor to himself and Samuel Dietz, New York city), for a Burner for Kerosene Lamps:

I claim the combination of the lever, 2, and the spiral spring, 3, in the manner described, the parts being constructed, combined, and operating substantially as set forth.

38,544.—William Atkinson, Brooklyn, N. Y., for an Apparatus for Sewerage, &c. Antedated Oct. 26, 1862:

I claim an apparatus whose principal elements consist of a floating vessel having one or more compartments or any portion of its interior constructed and arranged for the reception of such deposits of solid matter or of muddy water or water containing solid matters; a pump or pumps and pipes or other equivalent means of delivering the such deposits or water into said compartments or space; one or more filters or strainers to provide for the escape of water from said vessel, and the retention of the deposits of solid matters therein, and suitable means of discharging the deposits or solid matters, the whole combined to operate substantially as and for the purpose herein specified.

38,553.—Eli Brazelton, St. Louis, Mo., for a Centrifugal Pump:

I claim the water-lock, j k, in combination with the revolving disk, B, of a centrifugal pump, constructed and operating substantially in the manner and for the purpose herein shown and described.

Also the arrangement of the outer casing, A, and inner cylinder, D, with respect to each other, so that the inner casing forms a part of the water-way, being connected with the supply-pipe through the outer casing as shown and described.

Also the arrangement of a vertical propeller-wheel, B, having an annual opening extending all around on the periphery of the top side of the wheel for the upward or vertical discharge of the water through a water-way in the outer casing as specified.

38,560.—Seth L. Cole, Burlington, Vt., for an Apparatus for distilling Pine Wood, &c.:

I claim the above-described apparatus, as described and set forth in the drawings and specifications, for extracting the oil or spirits of turpentine directly from wood by means of a furnace arranged and combined with a retort, a gas-receiver, refrigerator, and condensers; a distilling or refining apparatus and skeleton cylinder or iron basket, in which the wood is placed and conveyed into the retort. The several parts of said apparatus I claim and use, in combination with each other, for the purpose of extracting oil or spirits of turpentine directly from wood, and saving the residuum or tar, from the same, in the manner and as set forth and represented in the drawings hereto attached, and substantially as described in the above specifications.

Second, I claim the retort with the open cone-shaped bottom constructed and operating as herein set forth and described.

38,561.—Robert Cornelius, Philadelphia, Pa., for a Gas Regulator:

I claim the employment in gas regulators of a thin mica disk or plate which operates by its elasticity to regulate the passage of gas.

38,562.—Robert Cornelius, Philadelphia, Pa., for Lighting Gas by Electricity:

I claim, first, The combination of the cylindrical or bell-shaped metallic piece, A, the cylindrical or bell-shaped hard-rubber piece, C, and the fur or woolen lining of the metallic piece arranged and operating as above described.

Second, The employment of a combination of silk and fur to form a lining to this metallic piece, C.

Third, The combination of the metallic bell-shaped or cylindrical piece, A, the bell-shaped or cylindrical hard rubber or non-conducting piece, C, and the metallic foil or its equivalent within the same, and the fur or woolen lining of the metallic piece, A.

Fourth, The connection of the metallic bell, A, with the pedestal, D, at the outer circumference of the pedestal.

38,563.—Robert Cornelius, Philadelphia, Pa., for Lighting Gas by Electricity:

I claim, first, A double electrophorus substantially as above described for lighting gas and other inflammable materials.

Second, I claim an air-tight electrophorus constructed and operating substantially as above.

Third, I claim the metallic tube with the interior sliding-piece, substantially as above described.

Fourth, The non-conducting piece, B, for uniting the metallic tubes, A and A'.

38,567.—Celadon L. Daboll, New London, Conn., for a Wick Tube for Lamp Burners:

I claim the form and manner of constructing the tube for lamp-burners for kerosene and other oils and fluids, as substantially set forth in the above and foregoing specification.

38,578.—John B. Ghormley, Bellefontaine, Ohio, for a Cattle Pump:

I claim the combination and arrangement of the vibrating or swinging platform, C, troughs, F F', pump, H, pipe or spout, q, and conducting spouts, r r', substantially as herein described and for the purpose specified.

38,602.—Jacob Reese, Pittsburgh, Pa., for an Oil Still:

I claim the use of partition fire-walls in still furnaces, each having a gutter or air-flue in its upper surface, so situate in relation to the still that the seams or joints of the still shall be situate over the gutter or flue, while the wall on either side of the gutter is in close contact with the surface of the still, in the manner and for the purposes hereinbefore described.

Also the use, in combination with the guttered fire-walls enclosing the joints of the still, of air-flues, for the purpose of passing a current of cool air along and over so much of the joint and rivets of stills as are situate in that part of the still which is situate within the fire-chamber of the furnace, and thereby preventing the opening of the joints, and carrying off any oil which may leak from the still.

Also the use of two or more goose-necks in a single still where the still is so constructed as that a separate vapor space is formed for each goose-neck, while the fluid distillate is allowed to pass freely between the compartments thus formed.

Also the use, in stills, of partitions extending below the lowest level of the fluid to be distilled, so as to separate the vapor in each compartment from that in the adjoining compartments, and afford a free passage between the compartments of the fluid to be distilled; for the purpose of allowing of the use of two or more goose-necks or vapor-pipes in one still, substantially as described.

38,620.—T. S. Williams and P. S. Page, Boston, Mass., for a Lamp for Railway Cars:

We claim, in combination with a lamp or lamp fountain, O, a case or socket, A, provided with the springs, B, and an oil receptacle or drip chamber at its lower end, as and for the purpose specified.

We further claim, in connection with the spring, B, and drip-chamber, the projections, c, arranged as shown, to support the lamp or fountain, and still admit the waste oil or overflow to pass into the drip-chamber, as herein described.

38,628.—J. R. Fogg (assignor to Samuel Adlam, Jr.), Portland, Me., for a Lamp Chimney-Adjuster:

I claim, first, The application to a lamp of a thin elastic strip of metal adapted to guide the cone or chimney to one side of the vertical axis of the lamp, and to support the chimney in an elevated position, substantially as described.

Second, Combining with the base of a removable deflector a thin strip of spring metal arranged in the relation to the vertical wick-tube, d, substantially as described.

38,640.—Adolph Millochau, New York city (assignor to himself and Alfred Berney), Jersey City, N. J., for a Paint Oil:

I claim, as a new product, or article of manufacture, the paint-oil, of a character substantially as described, produced from the acid residuum remaining after the purification of petroleum or coal-oil, or other bituminous oils, in the manner set forth.

38,641.—Adolph Millochau, New York city (assignor to himself and Alfred Berney, Jersey City, N. J.), for a Process of preparing Oil as a Substitute for Linseed Oil:

I claim the combination of these two methods, the whole together constituting a new and useful process for making a fine, clear, and limpid paint-oil, from the acid residuum remaining after purification of petroleum, coal-oil, or other bituminous oils, substantially as described.

1,480.—Adolph Millochau, New York city (assignor to himself and Alfred Berney, Jersey City, N. J.), for Preparing a Paint Oil. Patented March 17, 1863:

I claim making paint-oil, of a character substantially as described, from petroleum or coal-oil, or other bituminous oils, substantially in the manner set forth.

38,648.—F. H. Bartholemew, New York city, for a Valve for Water-Closets:

I claim the valve, G, and diaphragm, J, or its equivalent, placed within a suitable cylinder or box, F, in combination with the pan, B, and the lever, E, or other pan-actuating mechanism, arranged to operate substantially as and for the purpose herein set forth.

38,649.—Francis Baschnagel, Wenham, Mass., for the Manufacture of Water-Pipe from Bitumen, Pitch, &c.:

I claim the compound of hair or other fibrous substance and bituminous substances, in the proportions above described, and the process of manufacture above described.

GAS-BURNERS.

T. G. ARNOLD,
MANUFACTURER OF
GAS-BURNERS,
And Importer of SCOTCH TIPS,
No. 447 BROOME ST.,
Second door west of Broadway, New York.
Mercury Caps, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

ORNE'S PATENT FILTER REGULATING GAS-BURNER,
Admitted by all practical and scientific men who have examined its movements, to be
THE BEST GAS-BURNER YET INVENTED.
They are
Self-Regulating,
Gas-Purifying,
Indestructible, and
Most Economical.
For sale by—
S. A. STETSON & Co.,
350 WASHINGTON STREET,
Boston, Mass.

C. GEFRORER,
Manufacturer of
GAS-BURNERS,
For Lighting and Heating Purposes.
GAS HEATING AND COOKING APPARATUS; FITTERS' PROVING APPARATUS, &c.
No. 111 South Eighth St.,
Philadelphia.

ANALYTICAL CHEMIST.

C. ELTON BUCK,
Analytical and Consulting CHEMIST,
39 NASSAU STREET, NEW YORK,
Analyses of Ores, Minerals, Soils, Guanos, Coals, &c., and Tests of Commercial Articles, carefully and promptly made. Consultations may be had, and opinions given on Chemical questions. Samples for analysis from a distance, may be sent by mail or express, directed to the Laboratory as above.

STEAM-PUMPS.

WORTHINGTON'S STEAM PUMPS, extensively used by Gas-Light Companies. For Sale at greatly Reduced Prices.
Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.
Patent GATES, for Water and Steam-stops.
HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

WEST'S IMPROVED PUMPS, the most Simple, Durable, and Powerful, and the Cheapest in use.
J. D. WEST & CO.,
179 BROADWAY, N. Y.

PETROLEUM GAS.

THE AUBIN GAS-WORKS COMPANY, OF ALBANY, N. Y., have adapted their Works to petroleum and the heavy oil obtained from its distillation. Parties desiring information will be referred to Village Gas-Works thus adapted, where the ordinary yield of gas is from 150 to 200 cubic feet per gallon of oil. This yield, and the great improvements which experience has added to the Aubin Works, enable them to make a rich gas at a low cost—the only way to compete with kerosene.

D. PARRISH, Jr.,
GAS ENGINEER
And Contractor for Coal or Oil Gas-Works.
Estimates given for Gas-Works, Gas-Holders, or any Gas Apparatus.
To Manufacturers of Petroleum Gas.
For sale, Parrish's Patent Gas and Air Mixer, adapted to all works using Petroleum or other oils, by which rich Petroleum Gas is mixed, after it leaves the holder, with a proper proportion of air, giving it the greatest illuminating power, without smoke, through any burners. The apparatus being attached to the outlet pipe, requires no alteration of the works.
Apply at the Gas-Works of St. Nicholas Hotel, No. 63 Mercer st., N. Y., where one can be seen in operation; or address D. Parrish, Jr., St. Nicholas Hotel, New York city, or No. 1416 Arch street, Philadelphia.

GAS & WATER-METERS.

JOSEPH LENNIG,
1615, 1617, and 1619 Francis St.,
Above Ridge Avenue, Philadelphia, Pa.,
MANUFACTURER OF
WET & DRY GAS METERS,
STATION, SHOW, & EXPERIMENTAL METERS,
Photometers, Pressure Registers, Indicators, and Gauges, Governors, Meter Provers, Centre Seals, Fluid Gauges, &c.
GAS APPARATUS
Of the most reliable and approved construction manufactured and on hand at the
UNION GAS METER WORKS.

H. R. WORTHINGTON'S
PATENT WATER-METER.
This Meter combines
ACCURACY,
SIMPLICITY, and
REMARKABLE DURABILITY,
with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.
HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

A. CARR, MANUFACTURER AND DEALER IN WROUGHT AND GALVANIZED IRON PIPE, BRASS COCKS, VALVES, &c., and all descriptions of FITTINGS FOR STEAM, WATER and GAS,
135 MERCER STREET, New York.

FINANCIAL.

JOHN MOSS, Jr.,
BROKER.
83 WALL STREET, NEW YORK
Particular attention given to the negotiation of GAS-LIGHT and WATER COMPANIES SHARES and BONDS.

ALBERT H. NICOLAY,
STOCK BROKER AND AUCTIONEER,
No. 52 William Street,
NEAR WALL ST., NEW YORK.
Special attention given to the Buying and Selling of Gas-Light Companies' Stocks.

JOHN B. MURRAY,
No. 39 NASSAU STREET,
Opposite the Post Office, NEW YORK,
OFFERS FOR SALE
GAS-LIGHT STOCKS
In all the leading Companies.

GAS-FIXTURES.

Mitchell, Vance & Co.,
MANUFACTURERS OF
CHANDELIERS,
And every description of
GAS FIXTURES,
WAREHOUSE, No. 620 BROADWAY.
MANUFACTORY,
Nos. 335, 337, 339, 343 WEST 24TH STREET,
New York.

GEORGE H. KITCHEN & CO.,
Manufacturers of
Fixtures for Gas-Light Purposes,
Wood's Building, No. 561 Broadway, New York.
Office of the Inspector of Gas Meters for the State of New York.

THE AMERICAN METER CO.,

Organized under the General Manufacturing Laws of the State of New York.

SAMUEL DOWN, President. HENRY CARTWRIGHT, Vice-President. RICHARD MERRIFIELD, Secretary and Treasurer.

Trustees.

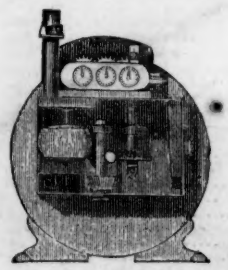
SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS and REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy, and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

340 WEST TWENTY-SECOND STREET, NEW YORK,
1504 FILBERT STREET, PHILADELPHIA,
23 & 25 BROMFIELD STREET, BOSTON, will meet with prompt attention.



HARRIS & CO.,

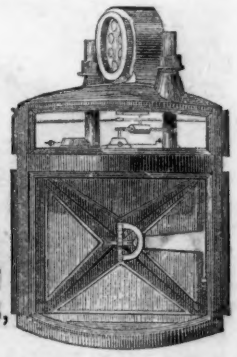
(LATE HARRIS & BRO.,)

N. W. CORNER 13TH & CHERRY STREETS,

PHILADELPHIA,

MANUFACTURERS OF

WET AND DRY GAS-METERS,



METER PROVERS, CENTRE SEALS, PHOTOMETERS, GOVERNORS, STATION METERS,
EXPERIMENTAL METERS, PRESSURE REGISTERS, PRESSURE GAUGES, &c., &c.

The firm of Harris & Co., which comprises the senior partner and only practical Meter maker of the late firm of Harris & Bro., will continue the manufacture of Meters, &c., of every description, and will guarantee to furnish an article of Meters equal to the best in the country, at the lowest rates, and combining the latest improvements with great durability and accuracy. The reputation of the Meters of the late firm of Harris & Bro. is confidently appealed to. All our Meters are tested by a sworn Inspector. Terms Easy.

HARRIS & BROTHER,

PRACTICAL GAS METER MANUFACTURERS,

Continue, as heretofore, at their old Establishment,

No. 1117 CHERRY ST., PHILADELPHIA,

TO MANUFACTURE
WET AND DRY GAS METERS (Consumers'),
STATION, EXPERIMENTAL AND SHOW METERS,
GLAZED METERS, METER PROVERS, AND PHOTOMETERS,
GOVERNOR AND CENTRE SEAL DRUMS,
FLUID AND PRESSURE GUAGES,
PRESSURE REGISTERS AND INDICATORS, &c., &c., &c.

All our work warranted. All orders addressed to
HARRIS & BRO., 1117 Cherry Street, Philadelphia.

PRINCE'S METALLIC PAINT,

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN, General Agent,
115 Liberty Street, New York.

Local Agents—S. R. Williams, 204 South Front st., Philadelphia.
Calvin Gay, 29 Doane st., Boston.

BOOKS FOR GAS ENGINEERS.

A Treatise on Gas-Works and the Practice of Manufacturing and Distributing Coal-Gas. By Samuel Hughes, Civil Engineer.

Gas Legislation, being a copious Index to the Metropolis Gas Act of 1860. By Samuel Hughes, C. E.

Report of the Proceedings of Both Houses of Parliament on the Metropolitan Gas Bill.

The Chemistry of Gas-Lighting. By Lewis Thompson, Consulting Chemist.

A few copies of the above books, invaluable to gas engineers, are for sale at the Rooms of the American Gas-Light Journal, No. 39 Nassau st., New York City.

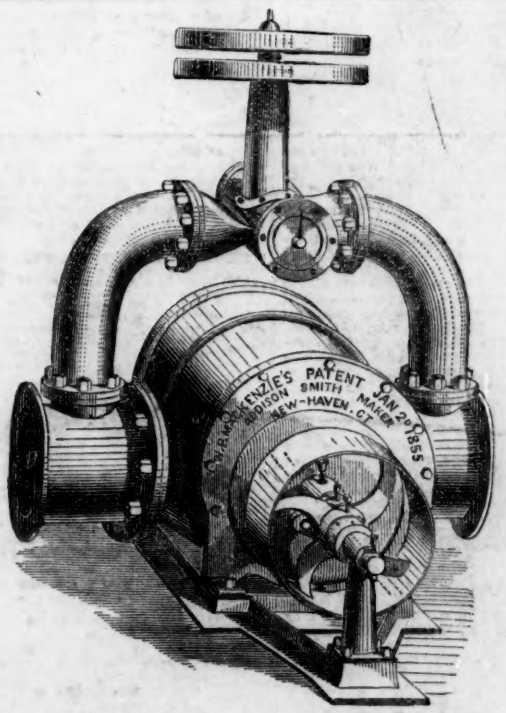
Gas Engineers who may want any scientific books will be promptly supplied at publisher's prices, by sending their orders, accompanied by the money, to this office.

NEW YORK FIRE-BRICK Manufactory. (Branch Works at Kreischerville, Staten Island.)

B. KREISCHER & CO., office 56 Goerck street, corner Delancy street, New York.

Gas-House Tiles and Fire-Brick of all shapes and sizes. Fire Mortar, Clay, and Sand articles of every description made to order at the shortest notice. B. Kreischer, M. Maurer, A. Weber.

THE AMERICAN
PETROLEUM COMPANY,
OF THE CITY OF NEW YORK,
No. 10 Pine Street.
W. W. CLARKE,
Vice-President.



SMITH & SAYRE,

Sole Proprietors and Manufacturers of

THE MACKENZIE PATENT GAS EXHAUSTER

AND

PATENT COMPENSATOR.

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the
MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address

SMITH & SAYRE, 458 Broadway, New York.

NEWSPAPER WRAPPERS. Mara's Patent Self-Sealing and Folding Water-lined Newspaper Wrappers, $1.50 per 1000. Sold by

HAMILTON, JOHNSON & FARELLY,
22 Ann st., New York.

CLARK'S PATENT STEAM AND Fire Regulator Co., sole Patentees and manufacturers of CLARK'S PATENT STEAM AND FIRE REGULATOR, No. 5 Park Place, New York.

W. H. Perrine, Pres.

VAN KIRK & CO.

Manufacturers of

CHANDELIERS, GAS FIXTURES, &c.,

Bronze Figures & Ornaments, Porcelain & Mica Shades,

COAL OIL BURNERS,

HAND LAMPS, COLUMNS, &c.,

No. 517 ARCH STREET, PHILADELPHIA.

Factory at Frankford, Philadelphia.

ALL GOODS WARRANTED.

DIETZ & CO.,

MANUFACTURERS, IMPORTERS AND DEALERS IN LAMPS,

And all Goods appertaining to the Lamp Trade,

132 WILLIAM STREET, NEW YORK.

PATENT AGENCIES.

SCIENTIFIC AMERICAN OFFICE, NEW YORK CITY—37 PARK ROW, WASHINGTON, D. C.—F AND 7TH STS.

MESSRS. MUNN & CO., publishers of the SCIENTIFIC AMERICAN and Patent Solicitors for the last seventeen years, would announce to the public that they never possessed better facilities for obtaining Letters Patent and transacting all kinds of business before the Patent Office than they now have.

During the *seventeen years* they have been engaged in procuring patents they have acted as Attorneys for more than SEVENTEEN THOUSAND patentees. Nearly one-third of all the applications for patents annually made in this country are conducted through the "Scientific American Patent Agency," and nearly all the patents secured abroad by American citizens are taken through this Office.

In making an application for a patent, all the inventor is required to do is to furnish a model with an explanation of the operation and advantages claimed. The drawings, petition, specification and other papers are prepared and presented at the Patent Office by MUNN & Co., who have a large corps of engineers, draughtsmen, specification writers and copyists in constant employment. Papers prepared at short notice.

Pamphlets of instruction, announcing the amount of fees, size of model, and other information as to the best made of obtaining patents in this and all foreign countries, are furnished free on application. For further particulars address

MUNN & CO.,
PUBLISHERS OF THE "SCIENTIFIC AMERICAN,"
No. 37 Park Row, New York.

ESTABLISHED 17 YEARS.

OFFICE FOR THE PROCURATION of Letters Patent and the Registration of Designs. JOSEPH WILLCOCK & CO., Patent Agents and Engineers, successors to Messrs. BARLOW & Co., 89 Chancery Lane, London, W. C.

Gratis and post free, "The Inventor's Manual," also a pamphlet, "L'Obtention de Patentes Anglaises," 500 Mechanical Movements; the first part of Kinematics, or the Transformation of Motion, by Joseph Willcock, C. E., Mem. Soc. of Eng. May be had at the above address, and of any bookseller. Price 2s. 6d.

The second part is approaching completion and will shortly be announced.

MESSRS. J. WRIGHT & CO., CONSULTING ENGINEERS and SOLICITORS of PATENTS, No. 42 Bridge street, Blackfriars, London, E. C. Patents for inventions obtained in all countries where Patent Laws are in force.

J. N. McINTIRE, PATENT ATTORNEY and SOLICITOR OF AMERICAN AND FOREIGN PATENTS,
Office, No. 37 PARK ROW,
New York City.

F. C. TREADWELL, JUNR., SOLICITOR OF PATENTS,
And expert in Patent Cases, 335 BROADWAY, (Moffat's Building.) New York.

AMERICAN AND FOREIGN PATENT AGENCY, Established 1838. Letters Patent for New Inventions procured in the United States, Great Britain, France, and other countries. SAMUEL W. SERRELL,
119 & 121 NASSAU ST., New York.

WOOD GAS.

THE INVENTOR AND PATENTEE of a New and Improved Retort for Manufacturing Gas from Wood, Turf, &c., would call the attention of Gas Companies, and the public generally, to an invention which will be a great saving to the community, as they can thereby supply an exceedingly cheap, clear, and brilliant light, besides useful products in profusion. The Works can be seen in successful operation at the Cremorne Gardens, Fourteenth street and Sixth avenue, on application at the office of the Patentee, No. 23 Liberty street, New York, and where any information may be obtained, and where Companies or private individuals wishing to purchase rights for Hotels, Factories, Private Houses, Cities, Counties, or States, will please apply.

WOODEN PURIFYING TRAYS.

PATENT
Conically Slotted Solid Wood Sieves
FOR GAS PURIFIERS.

CAUTION
TO
GAS MANUFACTURERS.

The Conically Slotted Solid Wood Tray was patented 21st October, 1862, by N. O. Hawxhurst, assignee of Wm. Combe, and all persons are cautioned against purchasing such trays of R. G. Hunt, or any other person except the subscriber, as it is a direct infringment of said patent. The following companies are now using these trays.

Manhattan, New York,
Williamsburgh,
Brooklyn,
Albany,
Baltimore,
Philadelphia,
Chicago.
Louisville,
And numerous others.

Orders received by mail or otherwise.
JOHN L. CHEESMAN,
147 Ave. C, New York City.

CLAY RETORTS.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE, ENGLAND,
Manufacturer of CLAY RETORTS, FIRE BRICKS, and every description of FIRE CLAY GOODS.

PHILADELPHIA FIRE-BRICK Works, corner of Vine and Twenty-third streets, Philadelphia.
JOHN NEWKUMET,
Manufacturer of all kinds of FIRE-BRICK, GAS-HOUSE TILES, to suit all the different plans in use. Clay Retorts and Dentists' Muffles. Orders filled at short notice.

IRON FOUNDRIES.

MORRIS, TASKER & CO.,
PASCAL IRON WORKS,
[ESTABLISHED 1821.]
PHILADELPHIA,
Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues, GALVANIZED WROUGHT IRON TUBES,
ARTESIAN WELL PIPES,
of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.
Gas and Steam Fitters' Tools, &c.
STEPHEN MORRIS,
THOMAS S. TASKER,
CHAS. WHEELER.
STEPHEN M. P. TASKER.

BERGEN IRON WORKS,
Established 1833.
R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES. RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

S. FULTON & CO., (Successors to Colwell & Co.) Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, also Heavy and Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.
SAMUEL FULTON, THEO. TREWENDT.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.
JOSEPH G. JONES,
205½ Walnut Street, Philadelphia.

THE ALPHA TUBE WORKS,
WALSALL, STAFFORDSHIRE, ENGLAND,
Established 1880.

LAMBERT BROTHERS,
Manufacturers of
LAP-WELDED BOILER TUBES, LOCOMOTIVE AND MARINE ENGINE FITTINGS,
Wrought Iron Welded Pipe,
FOR STEAM OR HIGH-PRESSURE WATER AND GAS;
HIGH-PRESSURE STEAM AND WATER VALVES,
FIRE & GARDEN ENGINE WORK, PUMPS, HYDRANTS, WATER-CLOSETS,
Iron and Brass Gas-Fittings, Gaseliers, &c.
AND OF THE GROVE BEDSTEAD WORKS, WALSALL.
Delivery Free, in Liverpool, &c.
Catalogues post free.

POOLE & HUNT, BALTIMORE, MD., are prepared to execute orders for
GAS-HOLDERS,
IRON-ROOF FRAMING,
And all other descriptions of
Iron Work for Gas-Works, Water-Pipes, and Heavy Castings, and Machinery generally.

R. D. WOOD & CO.,
MANUFACTURERS OF
CAST-IRON PIPE, RETORTS, &c.
Office, 400 Chestnut Street,
PHILADELPHIA.

J. VAUGHAN MERRICK, JOHN E. COPE. W. H. MERRICK,

SOUTHWARK FOUNDRY,
FIFTH & WASHINGTON STREETS,
PHILADELPHIA.
MERRICK & SONS, Engineers,
MANUFACTURERS OF EVERY DESCRIPTION OF GAS MACHINERY.
Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for providing Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Line Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.
Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

THE GROVER & BAKER SEWING MACHINE, everywhere triumphant. This Machine has taken the First Premium at the State Fairs last held in

New York,	Missouri,
New Jersey,	Kentucky,
Ohio,	Tennessee,
Indiana,	Virginia,
Illinois,	North Carolina,
Michigan,	Alabama,
Iowa,	California,

Including every State Fair at which it has been exhibited in 1862.

The Work made on the Grover & Baker Machine has taken the First Premium at every Fair in the United States where it has been exhibited to this date. GROVER & BAKER S. M. CO.,
495 Broadway, N. Y.

OUR AGENTS.

AGENTS OF
The American Gas-Light Journal,
From whom it can be purchased in single copies or by the year.
TERMS—$3 per annum. Single copies 15 cents.
Liberal discount to Dealers.

ALBANY, N. Y.	Thomas Hastings, P. L. Gilbert, Wm. J. Bell.
BOSTON, Mass.	D. Howard, Jr., Cushing & Bowen.
BRIDGEPORT, Ct.	News Agent at R. R. Station.
BUFFALO, N. Y.	T. G. Hawks, B. F. Felton, D. Lockwood.
CARMANSVILLE, N. Y.	W. Cameron.
CATTSKILL, N. Y.	W. Van Loan.
CHICAGO, Ill.	J. McNally, J. R. Walsh, Shear & Co.
CLEVELAND, O.	Hawks & Bros.
COLDSPRING, N. Y.	A. Tenant.
DOBBS' FERRY, N. Y.	E. Ackerman.
ELIZABETH, N. J.	R. Caldwell, Wm. Gale.
ELMIRA, N. Y.	M. B. Brink.
FALL RIVER, Mass.	L. J. Moroo.
FISHKILL LANDING, N. Y.	J. R. Van Slyke.
FISHKILL VILLAGE, N. Y.	B. Stanbach.
FORT WASHINGTON, N. Y.	J. Maloney.
FRANKLIN, N. Y.	G. W. Reynolds.
GALENA, Ill.	G. H. Schenck.
HARTFORD, Ct.	D. C. Pond, C. J. Geer.
HASTINGS, N. Y.	D. Crane.
HUNNESDALE, Pa.	A. G. Forbes.
HUDSON, N. Y.	G. Parton.
HYDE PARK, N. Y.	J. N. De Graff.
JAMESTOWN, N. Y.	G. W. Hazletine.
KINGSTON, N. Y.	C. Van Buren.
MILBURN, N. J.	W. Hastings.
MORRISTOWN, N. J.	J. West, J. R. Runyon.
NEWARK, N. J.	Agens & Co., J. R. Jillison.
NEWBURG, N. Y.	W. H. Callahan, J. M. Martin, P. C. Daly, G. P. Lomas.
NEW HAVEN, Ct.	E. Downs, T. H. Pease.
NEWPORT, R. I.	B. J. Tilley.
NEWTOWN, N. J.	H. Warren.
NYACK, N. Y.	H. Hazelbarth.
PEEKSKILL, N. Y.	J. A. Green.
PHILADELPHIA, Pa.	V. H. Myers, 152 South Fourth street.
PITTSBURG, Pa.	J. W. Fittock, Henry Miner, L. P. Hunt.
POUGHKEEPSIE, N. Y.	J. H. Bush, W. Patrick, G. Williamson.
PROVIDENCE, R. I.	D. Kimball,
RAHWAY, N. J.	W. H. Neefers.
RONDOUT, N. Y.	A. M. Barbes, Winter Bros.
SARATOGA SPRINGS, N. Y.	A. Hill.
SAUGERTIES, N. Y.	T. J. Barrett.
SING SING, N. Y.	F. Bushers.
SOMMERVILLE, N. J.	C. Barkalow.
STAMFORD, Ct.	G. R. Treate. News Agent at R. R. Station.
ST. JOHNSVILLE, N. Y.	G. A. Russell.
SYRACUSE, N. Y.	J. H. Green.
TARRYTOWN, N. Y.	C. De Riviere.
TOLEDO, O	L. C. Shear.
TROY, N. Y.	L. Willard, J. F. Hoyt.
WASHINGTON, D. C.	Frank Taylor, P. De Vine, Kirkwood House, News Agent Willard's Hotel.
WATERBURY, Ct.	D. J. Bishop.
WELLSVILLE, N. Y.	Wm. Patton.
WEST POINT, N. Y.	H. N. Sheerar, R. A. Grand, opposite West Point.
YONKERS, N. Y.	D. Burns, John Featherstone.

General Agents in New York City.

ROSS & TOUSEY, 121 Nassau Street.

H. DEXTER & Co., 113 Nassau Street.

ORIE, DAYTON & JONES, cor. Ann and Nassau Sts.

L. N. SHEAR & Co., 55 Hudson Street.

HAMILTON, JOHNSON & FARRELLY, 22 Ann Street.

J. F. FEEKS & Co., 24 Ann Street.

F. S. THOMSON, New Haven Railroad Station, 27th Street.

THOMAS FITZGIBBONS, New Jersey and Amboy Railroads.

ALEXANDER CRAW, Harlem Railroad Station, 26th Street.

WM. SKELLY, Greenwich Street, Erie Railroad Station, Duane Street.

In Canada.

THE AMERICAN GAS-LIGHT JOURNAL can be ordered through any of the News Agents in either of the Canadas.

In Great Britain.

Terms 12s. per annum, single copies 10d.
TRUBNER & Co., 60 Paternoster Row, London.

In France.

Terms 15 Frs. per annum.
Bureau of *Le Journal de l'Eclairage au Gaz*, Boulevard de Poissonniere, No. 24, Paris.

ROOMS IN NEW YORK.—No. 39 Nassau Street, opposite the Post Office.
Terms—$3 per annum. Single copies 15 cents.

JUL 31 1947